User Beats IBM To Cardless 115

By Mal Stiefel

Special to Computerworld

MARYLAND HEIGHTS, Mo. – Permaneer Corp., a local furniture and building products manufacturer, has been successfully running a cardless IBM 370/115 in its headquarters' DP facility for three months, according to Vincent Heiker, the company's management information systems director.

The 115, with 160K bytes of core, runs under Release 31 of DOS/VS and Power. The configuration includes four 3340 disk spindles with 280M bytes of storage, four 3410 tape drives and a 3203 high-speed printer.

IBM only recently introduced a cardless capability for the 370/115 [CW, Nov. 19], and first shipments from the supplier are not scheduled until the second quarter.

Permaneer replaced four keypunches, a verifier, an IBM 2560 card reader/punch and a Sycor, Inc. data terminal with IBM 3741 key-to-diskette stations and a 3540 diskette/computer input/output unit.

Four 3741's were installed in headquarters (two with communications capability, two without) and another with communications in the company's Hillsdale, Mich., plant.

Savings in equipment, labor and supplies have already reached $1,700/mo, and adjustments in operations not implemented are expected to yield an additional $900/mo, Heiker said.

Conversion was smooth, accomplished by two people in one week using a card-to-diskette utility supplied by IBM.

The equipment was delivered on Sept. 3, and fully cardless operation was begun on Sept. 9, he said.

Application programs weren't affected by the conversion; device assignments were modified in job control statements.

Keypunchers Trained Themselves

Keypunchers trained themselves on the new equipment with two days of help from IBM. After overcoming their initial apprehension, they found

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NEWSPAPER

Feature Code Compatibility

Burroughs 800s 1.5 Times Faster Than 700s

By Esther Surden

Of the CW Staff

DETROIT – Burroughs Corp. last week introduced its 800 series of medium- to large-scale systems which, it said, provide one and a half to four times more throughput than the firm's current 700 series.

The announcement was not unexpected. Ray W. Macdonald, chairman of the corporation's board, told a meeting of security analysts in late October the series was forthcoming [CW, Nov. 12].

Programs written for the 700 series are object code-compatible with the 800 series, Burroughs said, and can be run on the 800 system without modification.

The 800 series was designed to supplement the 700 series, a spokesman said. The B4800 in the 800 series, however, is an upgrade for 700 users, he added.

High-density, high-speed microcircuitry using Burrough's Current Mode Logic results in a 50% reduction in CPU, memory and input/output floor space when compared with 700 series models, the spokesman said.

Designed for use in multiprogramming environments, the 800 systems are said to provide enough processing power to allow users to implement extensive on-line, transaction-oriented terminal networks as well as integrated data base management systems and data processing networks.

Three Systems in Series

Three systems – the B4800, B3800 and B2800 – make up the 800 series. The B4800 systems include the B4840, B4841 and B4842 models.

The B4840 system has one CPU, one I/O subsystem with 16 to 64 channels and 200,000 bytes to one million bytes of 250 nsec error-correcting bipolar memory using the 2-byte word.

The B4841 adds file-protect memory and the B4842 has dual processors, I/O subsystems and file-protect memory.

The B3800 systems include the B3830, B3831 and B3832. All B3800 models have 100,000 bytes of MOS error-correcting main memory expandable to 500,000 bytes and a cycle time of 500 nsec.

The B3800's subsystems can have 16 to

(Continued on Page 2)

GE Says IBM Did Not Force Industry Exit

By Edith Holmes

Of the CW Staff

NEW YORK – The current chairman and chief executive officer of General Electric Corp. (GE) told the court hearing the government's antitrust suit against IBM here last week he knew of no IBM practice or act which forced GE out of the computer business in 1970.

Instead, Reginald H. Jones described the exit as a recognition of a missed opportunity on GE's part. The corporation "failed to make the necessary human and financial allocations at the appropriate time," he said.

When GE realized the opportunity presented by the computer business, it was too late to catch up – the investments required were prohibitive, he added.

The last of four witnesses called by the government to describe the GE experience in the industry, Jones' testimony served as a capstone to remarks made by Dr. John W. Weil [CW, Nov. 19], Richard M. Bloch [CW, Dec. 3] and John Ingersoll (see related story on Page 35) during the past month at trial.

While they might disagree as to the timing of the error, all agreed GE had mistakenly missed its chance to take a leading role in systems manufacture and praised IBM for its competent management in acquiring first place.

Jones, in particular, suggested IBM succeeded in the computer business because it satisfied its customers through the prices, features and performances of its systems while still maintaining a profit.

Not Government Intention

The government, in its pretrial brief and in its opening statement before Judge David N. Edelstein on May 19, indicated it never intended to show IBM forced GE out of the computer business and that GE officials would testify the corporation made mistakes.

Peter Goldberg, the attorney with the Department of Justice who is responsible for this portion of the case, did hope to prove IBM had the power to exclude competition in the sense that GE did consider that corporation's dominance in the marketplace in deciding to merge its computer operations with those of Honeywell in 1970.

The inference that GE might consider IBM responsible in some way for its demise in the industry did not follow, however.

IBM-counsel David Boies asked directly on his cross-examination of the witness whether GE had been forced from the market, and Jones responded with equal ease that, to his personal knowledge, IBM had not engaged in any tactics or practices which would have caused this result.

The GE chief added that, as a member of the Ventures task force established in October 1969 to investigate the corporation's involvement in computers as well as in nuclear reactors and jet aircraft engines, no such actions "were brought to my attention."

Vice-president of finance for GE when named to the three-man task force, Jones testified the group decided to look into the computer business first because GE had not made as many contractual commitments there as it had in the nuclear and jet engine businesses and so had more

(Continued on Page 4)

Supreme Court Hears Arguments In Contest Over Software Patent

By Don Leavitt

Of the CW Staff

WASHINGTON, D.C. – Arguments for and against patenting of software filled the historic chamber of the U.S. Supreme Court last week as attorneys completed the process of submitting the Thomas R. Johnston case to the high court for review [CW, Dec. 3].

Presentations by attorneys Howard E. Shapiro of the Justice Department (for the Patent Office) and Morton C. Jacobs of Millman & Jacobs (for Johnston) were spiced by questions from the bench, especially from associate justices William H. Rehnquist and Byron R. White.

Observers noted the arguments and the questions seemed directly related to the subject, with Rehnquist in particular showing an interest and understanding of aspects of computing and data processing.

There are no legal requirements or even traditions governing how soon any given decision might be rendered. However, Jacobs indicated, after his appearance, that he wouldn't be surprised if a ruling came down "in about a month."

The court is made up of essentially the same men who heard the Benson-Tabbot case, but there are differences. Associate Justice William O. Douglas, who wrote the 1972 decision, has retired.

Associate Justices Lewis F. Powell and Potter Stewart, who did not take part in the earlier case, were present for the

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Printouts of Wallace Backers Missing

By Ann Dooley

Of the CW Staff

JACKSONVILLE, Fla. – The presidential campaign headquarters of George C. Wallace here was ransacked and computer printouts naming contributors and the amounts given to the campaign were stolen over the weekend of Dec. 6.

Joann Teague, office manager for the recently opened headquarters, discovered the theft. "Whoever came in this office knew what he wanted," she said.

"The entry had to be made for political reasons" since the office is in an extremely high-security building and police have determined entry was made with a key, she said.

Gov. Wallace has made no formal announcement concerning the theft, but Joe Azbell, director of communication in the Montgomery, Ala., headquarters, denied any Watergate-like conspiracy.

"If it was done for political reasons, it was probably an overzealous individual," he said. "We're not sure why he wanted the printouts. He could have gotten them from the Federal Election Board in Washington, D.C."

To get the records from Washington, much time and money is needed, and one campaign worker thought the information might have been wanted before the Florida primary in March.

The printouts were a list of hard-core supporters in Florida. "They wouldn't do him any good," Azbell said. "These are the people who have been supporting Gov. Wallace for years, and they would never be influenced to change.

"The only purpose that might be served would be to find out who Wallace people were and what the concentrated areas of support are in time for the primary."

Besides the printouts, petty cash, letterhead paper and names of volunteers were taken. The Wallace campaign is the only one which is almost completely computerized.

The police said the case is "still up in the air" and are pursuing several leads.

Burroughs 800 Series Faster Than 700 Systems

(Continued from Page 1)

40 channels. Basic model differences are the same as in the 4800 series.

The 2800 system has only one model with one CPU, one I/O subsystem with 8 to 16 channels and an optional data rate of 1.5 or 3M byte/sec. Memory is 100,000 bytes to 500,000 bytes of 650 nsec error-correcting MOS memory.

Peripherals, Subsystems

Peripherals and subsystems for the 800 series include an I/O subsystem with up to 64 channels, each with its own Data Link processor. The processors accept I/O commands and execute them independently of the central processor.

Each Data Link processor handles only one family of peripherals. The processors have buffers that vary in size and number according to the peripheral they are serving.

The contents of one buffer is transmitted to the CPU when the buffer is full, a spokesman said.

Two types of Data Link processors are available for data communications, he added. One acts as a single-line controller and the other interfaces to a data communications processor that drives up to 32 lines.

A head-per-track disk file for random access storage was also announced with the systems. File capacity is from 5.5M- to 472M bytes with a 650 kbyte/sec transfer rate and 5 msec average access time.

Removable dual disk pack drives with capacities from 120 million bytes to 1.04 billion bytes are also included. The average access time is 33.3 msec and the data transfer rate is 605 kbyte/sec.

A large data storage subsystem that can store 348.8 million to 2.8 billion bytes of data on dual drives with an average access time of 42.5 msec and a transfer rate of 625 kbyte/sec was also announced.

A 1,500 line/min printer with 48-, 72- or 96-character sets are also available.

Memory Regulates Flow

The 800 systems' memory control feature is said to regulate the flow of data between main memory, the CPU and the I/O subsystem, with the I/O system having highest priority.

A file-protect memory feature standard on all but the 2800 prohibits dual systems from simultaneously accessing the same record, the spokesman said.

Software for the 800 series includes the integration of the DMS II data base management system with the Master Control Program so that data base management subroutines are part of the operating system, the spokesman said.

The Tabs VI reporting system provides users with reports about systems activity, including histograms, and provides the information required to charge the use of resources to the users of the systems, according to Burroughs.

Diagnostic aids allow maintenance engineers to pinpoint faults within the system and environmental monitoring techniques enable the system to transfer programs and data to secondary storage should heat levels damage a system.

The 800 systems were designed for use as host systems and as remote processors in decentralized networks, Burroughs said. As hosts, they can concurrently handle networks consisting of remote job entry terminals, interactive time-sharing terminals, on-line data entry terminals and terminals referencing and updating a transaction-oriented data base.

The systems concurrently handle application programs and direct messages and files to other systems in a decentralized network, Burroughs said. They can also be used as message-switching units and data concentrators for large-scale computer systems, the firm added.

The B2800 systems range in cost from $485,000 to $750,000 with comparable monthly lease rates from $12,000 to $18,500.

B3800 series prices range from $605,000 to $1,135,000 with monthly lease rates from $14,000 to $26,500. For the B4800, prices range from $850,000 to $3,725,000 with monthly lease rates from $19,500 to $85,500.

The 800 prices represent a 20% to 25% increase in cost over the B2700 and B4700, Burroughs said, and a 10% to 20% increase in cost over the B3700 series.

The company would not announce prices for – or even define – "typical" systems.

Free Directory Lists Schools With DP Courses

WASHINGTON, D.C. – The 1975-76 *Directory* of accredited vocational schools includes a listing of over 60 schools teaching computer programming, data processing and computer maintenance.

The National Association of Trade and Technical Schools (Natts) publishes the directory and described it as "a useful guide for locating training facilities and/or qualified graduates."

The *Directory* is free and may be obtained from the Publications Department, Natts, 2020 L St. N.W., 20036.

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Received Wrong Information

Fla. Trooper Acquitted in DP-Related Shooting Death

By Catherine Arnst
Of the CW Staff

TALLAHASSEE, Fla. – The Florida state trooper who shot and killed a man after being mistakenly notified through the state's crime computer the man's car was a stolen one [CW, Dec. 10] has been acquitted on grounds of justifiable homicide.

Six male jurors acquitted Robert Rennie Jr. after a two and one half hour inquest held Dec. 4 because "all they could go on is what Trooper Rennie believed to be the case," Cpl. M.W. Sanders of the Florida Highway Patrol said.

The victim, Frank D. Booth, was on the way to his father's funeral when he pulled off the road, where he was spotted by Rennie. The trooper radioed an inquiry on Booth's license tag number to a dispatcher with access to the state's criminal justice system.

Booth's tag bore the same number as a car stolen in 1971 because Florida changes the color of its tags each year but does not delete numbers used in past years.

A police inquiry into the criminal justice system, however, can indicate a "hot" car merely by radioing in the tag's number and not its color, which is what happened in Booth's case.

Rennie was already talking to Booth when he received the information that the car was stolen, Sanders said. He then drew his gun and told Booth to place his hands on his head.

The driver reached into his coat, causing Rennie to think he was reaching for a gun, and the trooper shot him.

An autopsy later revealed Booth had been drinking heaviliy, but this was not known to Rennie at the time of the incident, Sanders said.

"Almost everyone I talked to" is in agreement with Rennie, Sanders said. It is standard procedure for a trooper to approach a suspected stolen car with his gun cocked, he added.

"You have to cover yourself," he said. Four state troopers have been killed in Florida in the past year and a half, and 53 have been assaulted so far in 1975, he said.

This 'Hit' Not a Miss

ASHKUM, Ill. – A state trooper patrolling the interstate highway near here recently checked the license number of a vehicle apparently abandoned on the shoulder of the road.

A check with the Law Enforcement Agencies Data System (Leads) and the National Crime Information Center (NCIC) showed the car had been stolen in Cook County and entered into the system earlier that day.

The trooper discovered a young male sleeping in the rear seat and took him into custody.

Further checking revealed the man was wanted for armed robbery and rape of the automobile's owner, and he was turned over to Cook County authorities.

Supreme Court Hears Software Patent Case

(Continued from Page 1)

Johnston submission.

Associate Justice Harry Blackmun excused himself from both Benson-Tabbot and the current case.

In its half hour, the Patent Office asked the high court to review the decision of the Court of Customs and Patent Appeals (CCPA) which found in favor of a patent for Johnston.

Shapiro told the justices a patent was not justified in this case, since a general-purpose computer such as Johnston used was designed to be modified or programmed to do a specific task for the user, just as Johnston's invention did.

In effect, programs are "cookbook recipes" or descriptions of methods by which a user expresses his desires.

Shapiro said he wasn't prepared to go as far as to deny patenting to all software, but the Johnston invention "might, at best, be a 'new use for an old machine,' and that is unpatentable."

For his part, Jacobs argued software such as his client developed is the only means by which the "electrical components, logic circuits and function circuits" that make up the hardware of a computer are "interrelated and interconnected in a circuit configuration" to do anything.

Software is what makes the configuration different for each user, Jacobs said.

'Very Few' Patentable

Answering a Rehnquist question, he said most programs are well within the current state of the art and not patentable. "Very few" go beyond that point, but those that do clearly deserve patent protection, he said.

He stressed that, whether an inventor achieved a result through hardware or software should be immaterial, the means should be deemed equivalent in the eyes of the law.

The failure to recognize the equivalence leads to situations such as that caused by a recent lower court decision involving Digitronics Corp.

In that case, Jacobs said, the decision "allowed infringements of a hardware patent with impunity if the infringement is accomplished through software."

In a quick rebuttal at the end of the hour set aside for the case, Shapiro noted that the illustration of a circuit configuration of hardware and software Jacobs had used, both in his written brief and in his court appearance, had not been in Johnston's application.

Johnston's application clearly rests instead, he said in closing, on a general-purpose computer (in this case, an IBM 1400 series unit).

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Model Finds Ozone Depletion Not as Fast as Thought

By John P. Hebert
Of the CW Staff

CAMBRIDGE, Mass. – The destruction of the protective ozone layer in the earth's upper atmosphere, caused by the release of aerosol propellants and refrigerants, is less rapid than previous computer models calculated, according to the unpublished results of a computer simulation study undertaken here recently.

The rate of ozone depletion by chlorofluorocarbons – better known as Freons – was found to be 50% slower than the first depletion modeling studies predicted early in 1974, according to Dr. Derek Cunnold, a research associate at Massachusetts Institute of Technology's (MIT) Department of meteorology, who conducted the recent study.

The results of Cunnold's study, however, "are not significant – it doesn't alter the magnitude of the problem of releasing Freons into the upper atmosphere," Cunnold cautioned.

The MIT study, which was paralleled by other atmospheric modelers, merely allows the scientific community and government bodies more time to decide what to do about the problem and to discover the exact nature of the chemical reactions, which are not now known, he said.

The reduction in depletion rate "brings attention to uncertainties in theories of ozone formation and depletion" and, consequently, in the accuracy of computer-based models of the atmosphere, Cunnold said.

To accomplish the modeling of ozone depletion, a batch terminal at MIT communicated with an IBM 360/95 at the Goddard Institute in Greenbelt, Md.

Atmospheric modeling is one of the most time-consuming simulations run on computer systems, Cunnold said. The simulation of ozone depletion required a myriad of mathematical calculations and took about 12 hours of machine time to run through the 100 known chemical reactions on the 360/95, he explained.

The simulation approached a real-time portrayal of ozone destruction in the stratosphere, he added.

"When studying ozone, it is clear a three-dimensional model is necessary because ozone is produced in the equatorial atmosphere, although most of the gas is found in polar regions of the stratosphere," he said.

Any model of ozone reacting with the chlorofluorocarbons must depict the transport and distribution of molecules simultaneously, he explained.

However, results of the MIT study, which used a three-dimensional approach, did not differ significantly from other recent studies based on vertical models.

User Gets Jump on IBM With Cardless 370/115

(Continued from Page 1)

the 3741 was easy to operate, and they managed to write their own programs for the unit.

An early problem was encountered in trying to write on the diskette from the computer running with the Power spooling package.

IBM took some time to find a solution because its local office wasn't familiar enough with the equipment at the start, Heiker said.

Another difficulty arose in communication between the central facility's 3741s and the nonprogrammable remote unit in Hillsdale. (Models of the 3741 include programmable/nonprogrammable options coupled with communications/no communications options.)

The systems were linked with 128-byte messages, but the 3717 line printer tied to the Hillsdale diskette was looking for 133-byte messages including the control character.

Permaneer also found that the remote 3717 and the 3715 printer hooked to one of the home office units had different sets of carriage control characters than the CPU's 3203 printer. Permaneer's programmers provided fixes to these problems on their own.

The company decided to eliminate cards as part of an ongoing cost-cutting effort that had seen its total DP budget drop by 75% from 1974 to 1975. Floppy disks supplied by BASF Systems are helping to achieve this savings.

It felt a key-to-disk system would ultimately reduce errors, cut supply costs and decrease transcription time. It also wanted to get away from the 80-character limitation on record size and the inconvenience of multicard records.

A long-range goal was to place keyboards in source data locations to eliminate the transcription step entirely.

Clustered key-to-disk systems from about a dozen manufacturers were considered first. They were rejected after a study concluded:

- Permaneer could not afford to have all stations down for more than an hour, but a serious malfunction in the controller could incapacitate all stations for hours or days.
- Some systems in the study (not all) had to be shut down for several minutes two or three times a day while data was being spooled to tape for computer entry. Again, this would adversely affect productivity at each station.
- Users of other clustered systems said that their operators were unhappy with the units and that they were difficult to program.
- If the card reader was to be abandoned, then Job Control Language (JCL) would need to be entered on tape, but Power didn't support JCL entry from tape. Even if that problem could be circumvented, it would inevitably tie up a tape drive on the 115.
- One manufacturer offered a diskette for JCL entry, but it was much costlier than the 3741.
- The clustered systems had a high cost per station, in small configurations, in comparison with the 3741.
- The study group felt the 3741 didn't have these shortcomings. It appeared to afford cardless operation, a high degree of backup, quick interchangeability of the diskettes and a low level of program complexity.

The group also evaluated the 3741 against the Sycor cassette terminal. It decided the Sycor unit was better suited to teleprocessing, but the 3741 made more sense for the data entry applications it had in mind.

IBM Did Not Force Exit, GE Chairman Tells Court

(Continued from Page 1)

leeway for alternative strategies.

In examining GE's involvement in computers, he noted the task force eventually recommended top management reject the Advanced Product Line (APL), devised by the company's Information Systems Group, and merge its computer operations with those of another company.

APL, Jones explained, was only a conceptual plan designed to attack IBM's 360.

The study developed by the group was "certainly not an exhaustive analysis of the computer business," Jones stated. Not only did the group work for a limited number of weeks, but the computer business is complex, and none of the people on the task force had training in the field.

Yet Jones felt the study analyzed the cost estimates and the technical requirements for APL sufficiently to make the recommendation to the board of directors on April 24.

'Invention on a Timetable'

In rejecting the APL, Jones said the task force considered the project in error because it was too ambitious technologically.

It put "invention on a timetable," he said, and, to that extent, APL couldn't promise success.

GE had very skilled people in the computer area, he added, but they were few in number.

Computers were always a spin-off and never a central element of GE's core business – the generation of electrical power, the GE executive noted further.

Unable to back every horse, having sustained a net loss of $162.7 million in its domestic computer business between 1957 and 1970 and committed to the development of nuclear power and jet engines, GE decided not to take on any ventures outside its core interests in 1970.

Had the company gone ahead with APL, it would have had to invest an additional $.5 million in the computer business, according to the information systems group estimates at the time.

To the extent that the government sought to show IBM dominance of the industry, Jones' remarks and the preliminary and final reports produced by the Ventures Task Force established GE's belief that IBM led in the field.

"I cam to understand that IBM was GE's most significant competitor – the one met most often in the marketplace," Jones stated.

And, in its final report, the task force noted: "It is our conclusion, however, that the APL entails very high risks and that it is doubtful that it could be kept to time, cost and system performance schedules.

"Even if General Electric were in a position to undertake such an ambitious program, we wouldn't recommend that it invest the requested sums in such a hazardous project predicated on an all-out attack on IBM, one of the world's strongest corporations."

But nowhere in Jones' testimony, in the testimony of the other GE witnesses or in the reports by the task force did the corporation attempt to place any blame for its small portion of the computer systems business – approximately 4% to 5% – on IBM.

To that extent, the government did not seem to prove its contention that the GE experience illustrated the "very high barriers for entry, for growth and viability that exist in this market dominated by IBM," several observers noted.

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By Next Century

Model Shows Coal Could Satisfy U.S. Energy Demands

By Catherine Arnst
Of the CW Staff

HANOVER, N.H. – The architects of a system dynamics computer simulation model of coal supply and demand have concluded here that coal might satisfy much of the U.S.'s energy demands by the next century.

The model, titled Coal-1, was designed by three scientists at Dartmouth College to aid in developing long-term energy policies concerning an acceptable transition strategy from reliance on fossil fuels to energy sources not tied to finite fuel reserves.

Coal-1 was conceived three years ago as a follow-up to studies done by the Club of Rome, according to Professor Roger F. Naill of Dartmouth, who developed the model along with Professor Dennis L. Meadows, also of Dartmouth, and John Stanley Miller, an assistant professor at the University of Southern California.

Financing for the model was provided by the National Science Foundation. "We originally planned an overview of energy transition problems," Naill said. "Then we decided to move toward more policy-oriented computer models."

"The many constraints on coal demand and supply are parts of an integrated system – any policy changes in energy demand, synthetics, power plant emission standards, strip mining legislation or health and safety standards will ultimately affect the evolution of the entire energy system.

"Coal-1 can keep track of these complex interactions so the effects of coal-related energy policies can be assessed throughout the total system over time," the scientists said.

Four Interacting Sectors

The model consists of four sectors which interact dynamically: energy demand, oil and gas, electricity and coal.

The most important sector is oil and gas, Naill said. It fills 80% of the net energy demand in this country; 20% of that amount is filled by imported fuel.

Three ways to satisfy oil and gas requirements are through drilling traditional wells, imports and converting coal to synthetic fuels, he added. It is assumed in the model that oil and gas are finite resources.

Oil and gas are generally believed to follow a life-cycle pattern of production which reached its peak production level in 1972, Naill said. Even if prices are deregulated, production will continue to drop in the future, so the country must shift to alternate sources, he said.

The model showed that, even under the most optimistic conditions, where energy demand is held at zero growth, a serious gap between energy supply and demand could affect the country between 1980 and 2010.

"Ultimate energy sources such as nuclear fusion, solar, wind, ocean thermal gradient, bioconversion and geothermal are the most desirable alternatives to oil and gas, but they probably cannot be expected to provide more than 10% to 20% of the nation's energy demand by the year 2000," the model's designers said.

Could Carry Burden

Coal could carry a major burden during this period if long-term policies are put into effect now, the model showed.

These policies should include diverting a large fraction of oil and gas investment to developing coal-derived synthetic fuels; installing pollution devices on smokestacks to reduce sulfur dioxide emissions, thus encouraging coal use; enacting legislation to allow strip mining under strict environmental regulations; increasing coal miners' wages; and reducing the accident rate in mines.

The scientists said the model demonstrated that, even with such policies, there will still be a short-term energy gap in the 1980s because coal production will not start fast enough to meet demands.

"I have heard nothing but total agreement from anyone who has seen the results of Coal-1," Naill said. He added that the model had the least conflict in data of any he'd done.

"I was amazed at how little conflict there is in the basic assumptions concerning energy," Naill said.

A contract for Coal-1 is currently being worked out with the Energy Research Development Agency, a federal agency involved in developing long-term policies for the country.

NWF Hatching National Data Bank To Save Eagles From Extinction

WASHINGTON, D.C. – The National Wildlife Federation (NWF) is hatching a computerized eagle data bank to help the American bald eagle, which is threatened with extinction.

"Information that may be vital to the survival of the eagle, our national symbol, is now scattered in libraries and laboratories across the nation," Thomas L. Kimball, executive vice-president of the NWF, said. "Pesticide effects discovered on the East Coast may never come to the attention of a scientist studying the same bird in the Pacific Northwest."

After turning over 1,100 acres of South Dakota land to the Federal government for an eagle refuge last December, the NWF decided there was an "imperative need" for a one-stop clearinghouse of eagle information, Kimball said.

Using an information retrieval system, one of the first tasks will be to pinpoint all eagle nesting and roosting sites in the country. After discovering which are in danger of encroachment, attempts will be made to acquire and protect them from further destruction.

"Eagles just aren't very tolerant of man," Kimball said.

"If they are to survive, we are going to have to make accommodations. By collecting everything that is known about how and where they live and making it available to experts in and out of government, we should be able to preserve this bird that is so much a part of our national tradition."

Bald eagles, once found throughout the country, live in eight states and have an estimated population of 2,600. Until 1940 they were legally killed as predators and, since then, have decreased because of destruction of their habitats and pesticides entering their food chain.

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'Multiimage Quadraphonic Portrait'

Boston Bicentennial Features DP-Based Presentation

By Catherine Arnst
Of the CW Staff

BOSTON – A computerized "multiimage quadraphonic portrait" of Boston offers a myriad of impressions of this city to both its residents and visitors as part of its bicentennial celebration.

"Where's Boston?" is a 45-minute multimedia presentation using 40 projectors that flash 3,097 slides on eight giant screens with a quadraphonic sound track in the background.

Keeping everything moving is a Command Performer System developed by Arion Corp., a company whose sole business is supplying equipment and programs for this type of presentation.

The presentation, designed and directed by Rusty Russell of Cambridge Seven Associates, Inc., is the end result of approximately $350,000 and 1-1/2 years of work.

It is unusual for a multimedia show, Russell said, because the computer-generated program is contained on the same tape as the sound track. Most systems have a separate digital tape.

The program was adapted from Russell's technical story board, which is a graphic presentation of the film.

Engineers at Arion translated the board onto IBM-like data cards that are pencil marked and, from these, developed a tape consisting of a series of "beeps" which cue in the slides.

The sound track, originally recorded on a 16-channel, 2-in. tape, was dubbed down to a four-channel, 1/2-in. Scully tape deck format. The head configuration was modified to accept a fifth channel containing the tape of program information.

The program information feeds into an Arion digital decoder which sends commands to 32 fader units.

These units translate the commands into signals to the projectors, enabling visual transitions and image-change combinations to take place (one unit used with a single screen, three projectors and one slide in each projector produces 30 basic visual transitions and more than 500 combinations of image changes).

There are about 250,000 commands used, and the time each slide remains on the screen varies from 1/10 of a second to 10 seconds.

Always in Sync

With this type of system the presentation is always in sync, since the commands are on the same tape as the sound track, Russell said. "We are using an address system rather than a sequential system as most multimedia shows do. With our system we can talk to any projector at any time."

The result is a barrage of images flashing on and off screens in a random fashion, surrounding the viewer with the experience of Boston. Subjects include the Boston Pops, the Red Sox, the neighborhoods and their problems and a Fourth of July fireworks display that gives the audience the impressions of being at its center.

Minimal Problems

"Where's Boston?" has had only minimal problems since it started, and "the percentage of accuracy is very high," Russell said.

The weakest component in the system is the carousel projector, which "is extremely reliable mechanically but crummy electrically," he added.

Russell has designed three similar multimedia shows for New York, San Francisco and Honolulu and considers the medium one where "you can motivate, but not educate" the viewer.

"The multimedia film has never convinced anyone to do anything. What it does is raise the absorption level of the viewer so that he is highly intrigued with the subject," he said.

The Boston presentation has been seen by approximately 60,000 people since it opened June 21 and will continue running until Dec. 31 next year. It is sponsored by the Prudential Insurance Co.

U.S. Women's History Data Bank Proposed As Index of Information

PORTSMOUTH, N.H. – A women's history resource data bank has been proposed by the American Revolution Bicentennial Administration (Arba) in honor of the country's 200th birthday.

The data bank would be used as a pointer index to indicate where relevant information can be found. There are already various repositories of information around the country, and the proposed data bank would eliminate duplication and catalogue all the material relating to the subject.

At the moment the project is still in the planning stage, and its feasibility is being studied through a $23,000 cost-sharing contract awarded to the Institute for the Study of Women in Transition.

"Most people are not aware of the information or where it is available and have no way of finding it," Linda McKinney, administrator for the institute, said.

The data base would use a key-word index which would be concerned only with women's issues in the U.S., but would include a broad range and many variables within that area.

McKinney said the need for such a data base has existed for some time and Arba realized this. She said the Institute is asking anyone who is aware of existing information to contact the institute at 5 Market Street.

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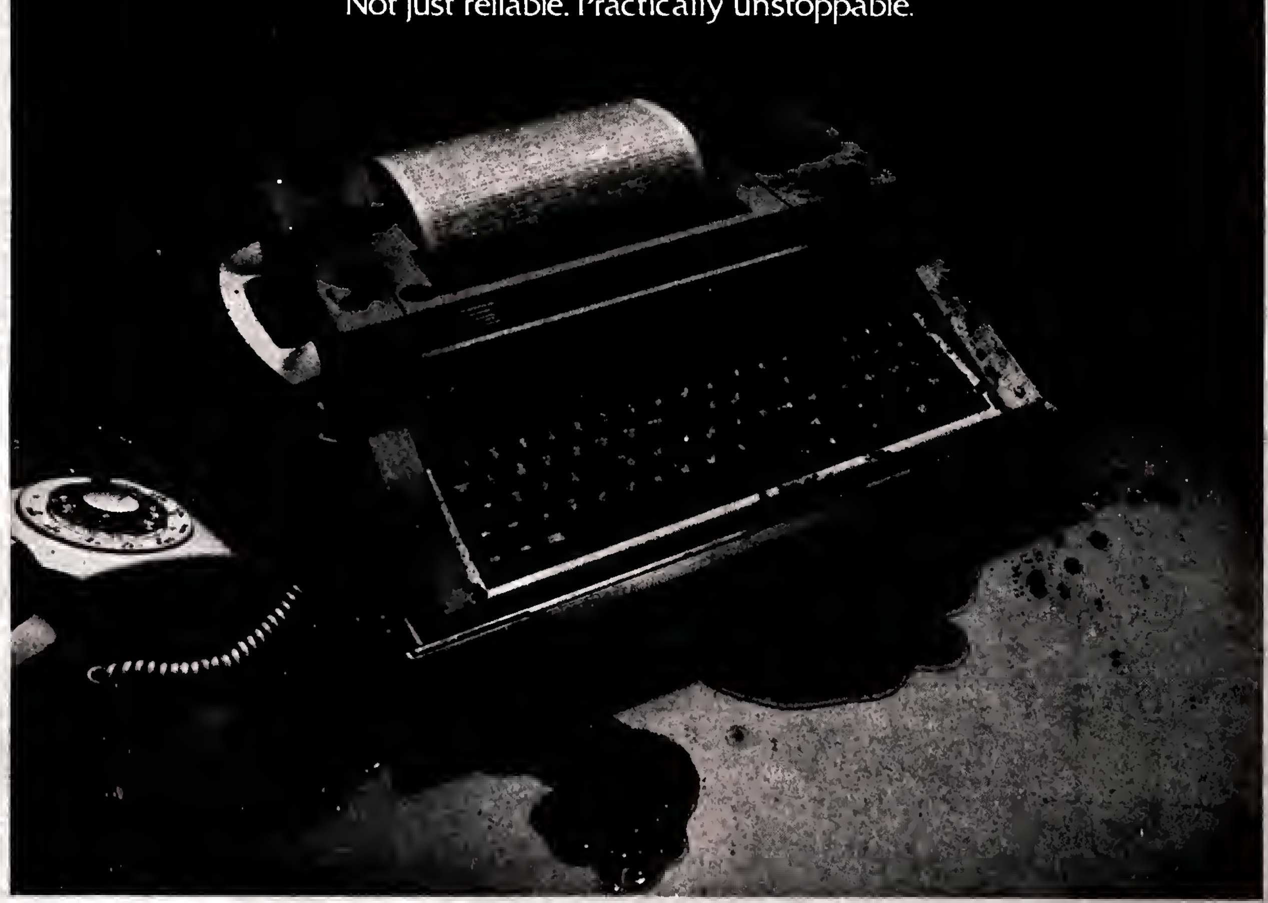

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DAY I – MONDAY, FEBRUARY 16

*9:30 - 12:30	*Applications; Manufacturing*
*9:30 - 12:30	*Applications; Service Industries*
*9:30 - 12:30	*Networks; Networking Revisited— Effect of New Facilities and Procedures*
*9:30 - 12:30	*Forum; Network Diagnostics*
*9:30 - 12:30	*Applications; Insurance*
10:00 - 11:30	*Workshop; Network Planning & Budgeting*
10:30 - 12:00	*Workshop; CPU's and DataComm Software*
*2:30 - 5:00	*Basics; System Planning & Administration*
*2:45 - 5:30	*Networks; Network Optimizing Techniques*
R3:00 - 4:30	*Workshop; Network Planning & Budgeting*
R3:00 - 4:30	*Workshop; CPU's and DataComm Software*
3:00 - 4:30	*Workshop; Communications Processors and Multiplexers*

* *Signifies sessions with 30 minute break for reviewing exhibits and for refreshments*
R Signifies Repeat Sessions

DAY II – TUESDAY, FEBRUARY 17

R8:30 - 10:00	*Workshop; Communications Processors & Multiplexers*
*8:30 - 12:00	*Networks; Optimizing International Networks*
8:30 - 12:00	*Forum; Bringing DP Power Closer to the User — Role of Terminals*
*8:45 - 12:00	*Applications; Government*
*8:45 - 12:00	*Applications; Banking & Securities*
*8:45 - 12:00	*Applications; Energy Industries*
*9:00 - 11:30	*Basics; Data Transmission Services & Modems*
10:00 - 11:30	*Workshop; Network Implementation*
10:30 - 12:30	*Workshop; Remote-Batch and Data-Entry Terminals*
*2:30 - 5:00	*Basics; Data Terminals*
*2:45 - 5:30	*Networks; Minis in Distributed Networks*
*2:45 - 5:30	*Forum; Bringing DP Power Closer to the User — Role of Small Business Computers*
R3:00 - 4:30	*Workshop; Remote-Batch and Data-Entry Terminals*
3:00 - 4:30	*Workshop; Interactive CRT and Hard-Copy Terminals*
R3:00 - 4:30	*Workshop; Network Implementation*

* *Signifies sessions with 30 minute break for reviewing exhibits and for refreshments*
R Signifies Repeat Sessions

DAY III – WEDNESDAY, FEBRUARY 18

R8:30 - 10:00	*Workshop; Interactive CRT & Hard-Copy Terminals*
8:30 - 10:00	*Workshop; Modems & Couplers*
*8:45 - 12:00	*Applications; Hospitals and Health Care*
*8:45 - 12:00	*Applications; Computer Services*
*8:45 - 12:00	*Applications; Retailing/Wholesaling & Distribution*
*8:45 - 12:00	*Networks; Optimizing Data Entry in Distributed Networks*
*8:45 - 12:00	*Forum; Rap Session on Distributed Networks*
*9:00 - 11:30	*Basics; Data Processors & Software*
10:00 - 11:30	*Workshop; Network Management*
R10:30 - 12:00	*Workshop; Modems & Couplers*
10:30 - 12:00	*Workshop; Data Transmission Services*
1:30 - 3:30	*Networks; Role of Remote-Batch Terminals in Distributed Networks*
R2:00 - 3:30	*Workshop; Data Transmission Services*
R2:00 - 3:30	*Workshop; Network Management*

* *Signifies sessions with 30 minute break for reviewing exhibits and for refreshments*
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32	Insurance
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41	Time Sharing
42	Information Retrieval
43	Time-Sharing Network
	Government
51	Law Enforcement – Federal or Local
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Editorials

Delaying Tactics

More than a year has passed since the Department of Justice filed its antitrust suit against AT&T, and there has been virtually no progress.

A favorite delaying tactic of defense lawyers is to challenge the jurisdiction of the court to hear a particular case. By raising the question of whether the court should hear a case, the lawyers manage to postpone the inevitable fact that at some point they will have to address the merits of the charges.

In the AT&T suit, it was both the phone company lawyers and the judge who raised the issue [CW, Dec. 10]. The Federal Communications Commission's (FCC) legal staff is now wrestling with the problem and expects to have an answer for the court soon on whether the commission should get the case.

Legal experts point out that AT&T probably could get a more sympathetic hearing before the FCC than it could in a U.S. district court.

But one of the Justice Department's charges of antitrust violations against AT&T includes a demand that the Bell System divest itself of its 23 operating companies. And no one is sure whether the FCC would have the power to order such a split-up.

All of this legal thrashing points to a long-lingering suit with no quick resolution of the issues.

Meanwhile, the AT&T lawyers have earned their fees by perpetuating the status quo; the Justice Department is stymied in its attempts to begin discussion of the antitrust charges; and the customers who may be the victims of monopolistic practices have little hope for speedy relief.

DPers Take Blame

It appears that 325 persons working on the New York State lottery, including the DP staff, will have to take the blame for lack of management control at the top.

A report by Arthur D. Little, Inc. (ADL) found there was no overall systems or programming control exercised by lottery officials over the DP staff [CW, Dec. 10]. And apparently the system (or lack of it) was left wide open for unintentional error and/or fraud.

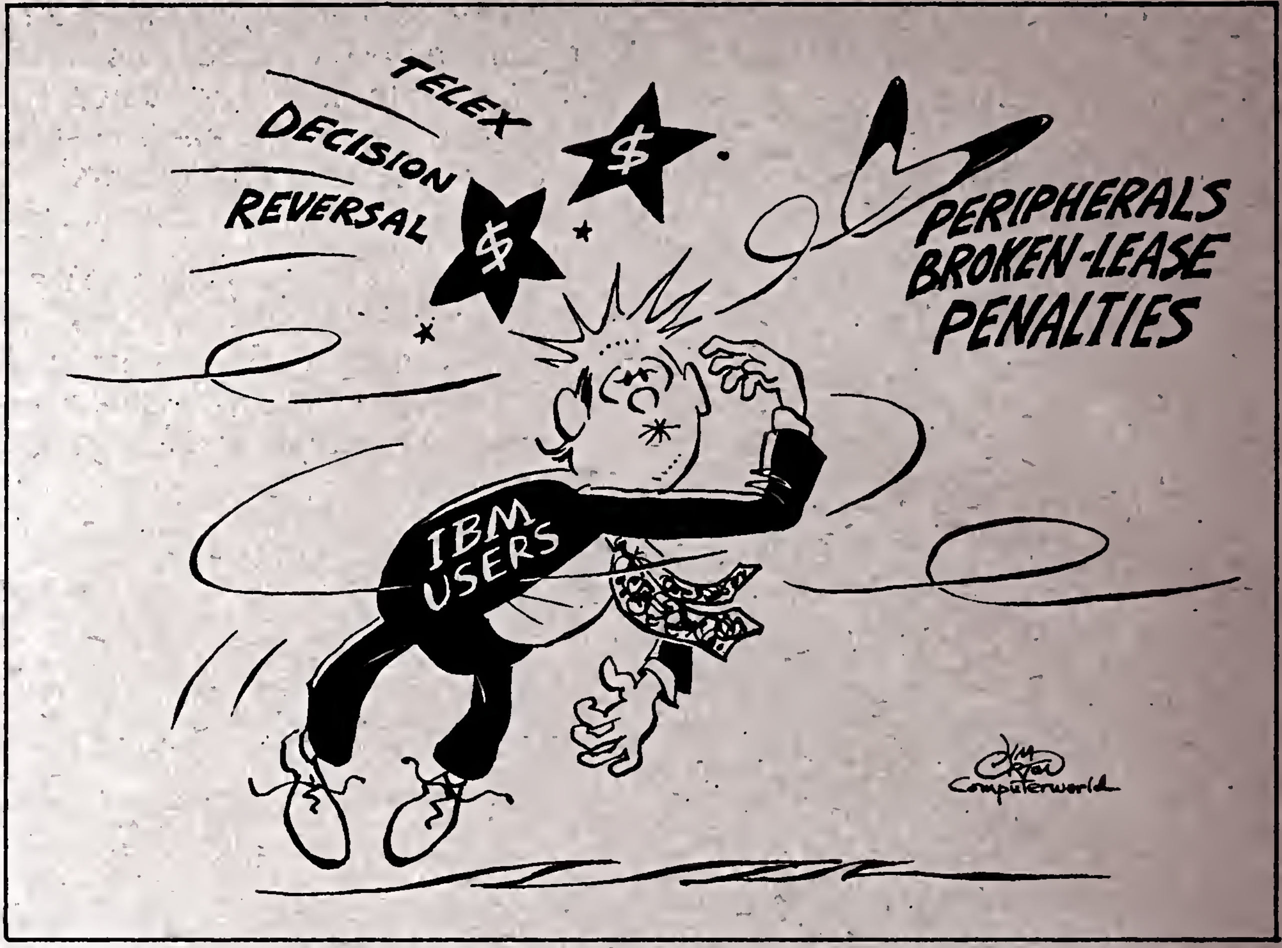
Nevertheless, it seems unreasonable for Gov. Hugh Carey to assume that firing the entire staff will help clean up the system. There were undoubtedly conscientious persons within the DP and other staffs that were doing their jobs to the best of their ability.

If only one programmer really understood all the programs, as ADL claimed in its report, it is difficult to see what is accomplished by firing that one keeper of all wisdom.

There are many analogies that could be drawn between the lottery's problems and the fiscal threats plaguing New York City. Carey seems to think that, when no one is minding the store, the best approach is to burn the store down.

Maybe, instead, it is the management team at the top in New York State that needs some careful manicuring.

In any case, a rebuilt lottery staff will now have to regain the confidence of those who will buy the tickets. A restructured DP operation will have to be one of the cornerstones of that project.



Letters to the Editor

CW Could Please All Subscribers With Pro-IBM, Con-IBM Editions

I have a suggestion which will enable *Computerworld* to do the impossible – that is, to please all of the subscribers all of the time.

Many newspapers, such as *The Wall Street Journal*, put out regional editions. CW needs to put out two editions each week; one slanted pro-IBM, the other con-IBM.

Then, by merely checking the appropriate box on their subscription forms, subscribers would all be happy with the publication.

Two editions would also give advertisers a chance to pitch their products differently to each group. (But heaven help the poor paste-up person who mistakenly puts the con ad in the pro edition!)

The only subscribers CW might lose would be those who are neutral-IBM. In my seven years in the business, I've never run into anyone who was neutral-IBM, so I don't think this would affect CW's circulation figures.

Seriously, maintaining a neutral editorial policy is akin to walking over Niagara Falls on a strand of barbed wire – barefoot!

CW is the fakir of computerland for succeeding so far. May it have continued success.

D.C. Stultz

Tampa, Fla.

Less Impressed With Unimpressed

David L. McMonigle's letter "Unimpressed With Overly Impressed" [CW, Dec. 3] left me even less impressed with his appraisal of the situation.

After all, when 85% of the software enhancement suggestions, formulated by common NCR users, screened and improved by Masterson's user committee and presented to NCR, are actually implemented into future NCR software releases, why shouldn't we users be enthused?

IBM will shrink to less than 10% of the market before allowing its users such a privilege.

In my personal experience, NCR's marketing practices have consistently configured hardware systems properly, whereas the higher powered IBM marketing people often employ undersell, biased configuration bidding and other devious tactics.

McMonigle commented that "NCR historically has not understood the problems of a diversified high-development computer applications environment."

Again, my experience has seen the quicker solving of technical problems via a well-organized chain of command to corporate software people at NCR.

Also, preferring to design my own software in contrast to 'packages' leaves the success and complexity of computer applications to my capability and comprehension of my company's unique system requirements. I cannot hang this responsibility on any vendor.

Finally, McMonigle's statement that "an 'unpackaged' NCR user will find the going rough, unless things have changed drastically" would be precisely correct if the word "rough" were replaced with "easier."

Ken Yoder

Elkhart, Ind.

NCR, Masterson Need No Defense

The letter from David L. McMonigle indicating his displeasure with Don Masterson's letter supporting NCR [CW, Nov. 19] was a classic example of hasty and poor judgment.

The NCR User Community (some 5,000 Century users) recognizes the significant contribution of both Don Masterson and his company, Midland Cooperatives, in advancing the field of computer technology.

Masterson has served for several years in the field of software improvements and is presently a leading member of the Software Advisory Committee (SAC), a function of the National Users Group.

His presentations of Midland's "On-Line Management Information Systems" are among the best this writer has heard, in spite of the fact that their hardware is poorly configured (according to McMonigle).

Don't make the mistake of interpreting this letter as a defense of either Don Masterson or NCR. Neither really needs it. Masterson's reputation stands on its own, and NCR has more than fulfilled its commitment to our needs, which is all we're qualified to speak for.

We installed our (poor) configuration four years ago and have not changed a thing in that time. We will be upgrading next year to a larger CPU and large disk drives.

None of this was dictated by top management; it was planned by top management. Too bad it doesn't work in McMonigle's company.

Donald R. Collins

Shelbyville, Ind.

Right About One Thing

I hope Edwin Levy doesn't "yawn" his company down the "tube" [CW, Nov. 26]. His unsophisticated CRT does tell whether his account code exists or not, but certainly does not tell him if it is invalid.

I wonder if Levy ever inverted two characters of his account code and arrived at another legitimate account code?

It is possible Levy's application does not require the check digit, but shame on him to think no one does.

Levy is right about one thing; his software is about three inches off the ground on the totem pole of sophistication.

Richard Blasko

New York, N.Y.

(Other letters on Page 12)

Negative Exports

One of the curious recurring themes of the last Washington decade has been the continuing refusal of the Pentagon-dominated Office of Export Control to permit sale of fancy computer systems to Soviet Russia. The Commerce people rechristened it the Office of Export *Administration* two or three years ago, probably on the same theory that makes homely mothers name their infant daughters Gloria or Belle.

Whether Kennedy or Johnson or Nixon or Kissinger are in charge up topside, licenses to export single large systems, let alone the considerable volume that no one even considers suggesting, are turned down. The latest and one of the most scandalous is the rejection of IBM's request to sell a 370/158 reservations system to Intourist. Jack Robertson reports that "industry sources" – wish mine were as good as his – indicated that DOD and the regrettable Central Intelligence Agency were worried because of the very large number of fancy disk drives involved!

Of course that sounds like the worst kind of nonsense, given the announced position at the end of the Sixties, when I was an insider, that the objective is to withhold *technology* from the Communist Bloc. Clearly the first two or three 3330s, like the first step into the proverbial elevator shaft, are the crucial ones; dozens thereafter hardly matter. But we all realize from noncomputer evidence that technology is not really what is at stake. If it were, we would not be selling our chip-laden fighter planes and missiles to Syria and Egypt. That technology is sold outside of Commerce Department control, and eagerly. Putting aside the argument that Grumman and Northrop are special clients of the services, and that the Mirage gives General Dynamics more fits than CII ever will IBM, we should focus clearly on the central question: If Defense is willing and even anxious for its aerospace contractors to sell quantitites of their most lethal products to countries beyond American control, and reveal very advanced digital technology early on, why will it not permit IBM and its competitors to sell quantities or even occasional single copies of big DP systems?

One thought does occur: Is it possible that a big enough order would make the difference? Perhaps Washington would not OK the sale of *one* F-16? But hundreds, at literally billions of dollars – was that too much to resist?

If so, IBM ought to scuttle around and sign up Moscow for, say, a thousand 370s, especially the new super-168s. Might work! The technology argument is clearly garbage, and all the struggling my poor little advisory committee did with channel characteristics and memory speeds and sizes was wasted; the real hotshot stuff goes into inertial guidance computers and airborne weapons controls first, and only later into general-purpose ground gear. In fact, it is sold in grim quantities to our potential enemies long before it appears in banking systems and commercial data communications.

I believe IBM and its rivals should demand a congressional inquiry into this discrepancy. Such companies have expertise in both areas. They can describe, perhaps in secure surroundings if the padlock-your-lip boys make trouble, just what levels of fancy digital technology go into the planes and missiles we sell, versus the levels in the 370 and its peripherals, or the Univac or Control Data equivalents. I would certainly volunteer to testify at such a hearing and could suggest others who willingly or under subpoena would have more recent knowledge. It isn't so much that we need the trade balance, or that CII will put the American computer companies to rout; I just plain old dislike some dour general, who hopes to be a vice-president in aerospace next year but who hasn't a hope of cracking Armonk, telling IBM "no sale" while he promotes super-fighter sales to the uglier Arabs!

We have seen more and more clearly in the last decade that the Communist countries, even the livelier ones like Poland and Romania, cannot close the five- or six-year gap in computer technology between their efforts and those of Western societies – indeed, cannot keep that gap from widening still further. We could sell the top of the new 1976 IBM line, and the big new machines CDC *claims* it is readying, in quantities to match our wheat exports. And in 1982, when the sixth generation is announced, the gray, glum *communistas* will be still struggling with OS/VS/NFS software and cursing capitalist perfidy, especially if IBM cons 'em into taking PL/2!

The proudest flag we fly today around the world is our technical proficiency: our computers, our chip wizardry, our basic science. And our 747s, with intertial navigation yet, of course: fly to America and see the latest in information science (but eat Iranian caviar and drink good Moselles while *en route!)*

I repeat, it's our proudest flag. Why not fly it freely, everywhere – in the GUM department store and at Intourist; in Moscow and Leningrad, in Warsaw and Belgrade, and in Red China some day. We have everything to gain and nothing to lose.

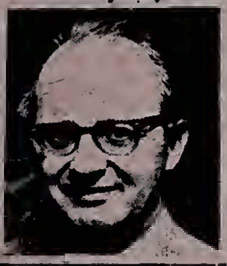
Herb Grosch

Despite Written Agreements

Unconscionability Concept Can Cure Contract Blues

The Taylor Report

By Alan Taylor, CDP



The story in Judge Morse's courtroom was depressingly familiar. After an investigation, a salesman and his manager had produced a flowchart which detailed how their firm's computer would automatically handle all aspects of the De Luxe Co.'s bookkeeping, accounting, reporting and inventory control.

Not merely that, but they also had assured De Luxe the machine had a built-in "40% expansion factor."

De Luxe signed the contract, which excluded any warranties except defects of workmanship found within 90 days, the vendor's liability for consequential damage and vendor responsibility for other writings such as proposals or oral representations. The contract also limited liability for any claim.

The system was never delivered, but was upgraded. The upgraded system ran eleven hours a day and didn't complete the job.

The user sued, and, in 1975, over eight years after the contract had been signed in December 1966, the judge knocked out the clauses which, on their face, prevented the user from getting damages.

The judge's reasoning was based upon a legal concept called "unconscionability" which could be important to many computer users who are faced with form contracts with similar types of exclusions – and still are asked to trust the proposals the same vendors try to disown!

How Unconscionability Applies

Clauses can be stricken from computer and other contracts when their enforcement would "unfairly surprise" the party damaged. (Legally, there is also the case of when he is "oppressed" but "unfair surprise" seems easier to understand and more often covers the type of things that happen in computer cases.)

One way to recognize such unconscionable clauses is to look to see how one-sided they are – under the circumstances existing at the time the contract was made.

These circumstances are those surrounding the particular contract itself, so it is perfectly possible that the same terms may be legal in one case while being illegal at another installation or at the same installation at some other time.

In the De Luxe case, the circumstances included fraud and deceit at the time the contract was made. The judge used his policing powers to permit direct damages in the case of negligence or breaches of warranties and for both direct and consequential damages where deceit was involved. (He didn't permit consequential damages for warranty breaches.)

The action of the computer vendor in disowning the flowchart and its written specifications about the machine capacity was the element of "surprise" Morse found existed.

He pointed out that the disclaimer was "overbroad," giving the seller not just 80% of the pie, but something close to 94.44% (I don't know where he got his figures).

Surprise in this case, the judge found, came from the attempt to disown the flowchart and the various written and oral representations about the capacity of the machine. This included the "40% expansion factor" and other such claims.

Such an idea is quite understandable. If a vendor submits a proposal to a user for an equipment purchase saying one thing and then asks the user to sign a contract indirectly disowning the proposal, the whole idea is distinctly surprising as a way of doing business. But many users have signed just that sort of order.

'Oppression' Concept

Oppression, the other legal concept, was also found here. The disclaimers made it possible for the vendor to send in some equipment that couldn't be meaningfully used to do the inventory control, etc.

Yet the whole idea of the contract was that the user would get equipment that could do the job. De Luxe just wasn't interested in entering the second-hand market for computer equipment or using it as a doorstop.

It wanted and reasonably expected equipment it could use, but the disclaimers permitted the vendor to demand full payment and yet not supply such equipment.

This denial of "reasonable expectation" brought the contract into the area of oppression and thus of unconscionability.

Again, there are many contracts which on their face would permit reasonable expectations to be ignored. Look, for instance, at some of the delivery and payment provisions.

Often there is no mention of the vendor's duty to deliver all the equipment, but any delivered must be paid for within 60 days or so. So someone could deliver a lot of boxes described as peripherals, fail to deliver the central processor and still demand payment!

That might well contradict reasonable expectation and so may not be legal.

Users, then, when they think they have been denied their reasonable expectations or have been unfairly surprised by some effort, can at least look a bit further than the contract terms.

Just because it's printed there does not always mean it's true, no matter what people would like you to believe.

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Reader Commentary

Combined With Common Sense

Psychology Reduces Data Entry Inefficiency

By E.M. Hughes

Special to Computerworld

Data entry is usually the weakest link in the data processing chain. Yet many of the problems which beset data entry divisions can be solved, when properly understood, by the application of a little common-sense psychology.

A study of keypunch/keytape personnel reveals two major factors underlying the majority of data entry problems: the low education level of the average keypunch/keytape operator and the lack of any feeling of responsiblity to the employer or company.

The first of these leads to slowness in learning and distrust of new equipment; the second to tardiness, absenteeism and a marked reduction in the number of hours which are spent working instead of conversing, using the telephone or making prolonged trips to the water fountain.

Almost all data entry problems can be traced to one of these two factors, but the problems themselves take many forms.

Many of the most vital problems stem from the slowness with which the average keypunch/keytape operator learns. For example, operators generally work most efficiently if they are taught each data entry job separately and individually, while making notes to which they will refer whenever the job appears.

Many errors and delays result from the inaccessability of information on how a given job is to be handled and the operator's unwillingness to wait until the answer is available.

This is especially true if finding the answer requires checking a booklet shared by several operators or waiting until the one person who knows the answer is free.

In cases like this, the operator usually takes a consensus of her neighbors' opinions (thus interrupting their work) and makes an "educated guess" – which is only correct about 50% of the time.

This problem increases drastically when the operator knows that keystroke averages are being checked, since pauses to find answers will lower the average.

Common Superstitions

Insufficient or inaccessible information on a job produces another of the curses of data entry: superstition.

One of the more common superstitions is that if a several-letter handwritten abbreviation frequently appears in some particular job, any handwritten abbreviation occurring in that job which has one character in common with it and is of approximately the same length is the same as the usual abbreviation and is to be entered that way.

Thanks to this superstition, LGN becomes LOG and CHG becomes CAB with suspicious regularity. Other and even more disastrous superstitions develop when alphabetic and numeric characters are insufficiently distinguished.

Under the circumstances, it is not surprising that programs bomb or produce unlikely results.

One of the most difficult problems to locate and solve stems from incompetence at a slightly higher level than that of the common operator.

Data entry equipment is usually programmable to simplify the operator's job by automatically executing skips, duplications and the like.

As programming is rarely entrusted to the individual operator, especially on systems where a mistake in programming can cause the erasure of the day's work, most programming is done by lower echelon supervisory personnel.

Unfortunatley, there is seldom much difference in background between these people and the common operator, with the consequence that the programs they set up are often inefficient for entering the data or so carelessly done that whole fields may be misplaced.

This leads to operators surreptitiously changing the program to more closely suit their needs or to blaming all errors on the program whether or not it was actually at fault.

A different set of problems arises from the operators' failure to feel any sense of responsibility to their employers.

These include the "overtime syndrome" (failure to do work during working hours so the paycheck can be artificially boosted by finishing the work, with many delays, in overtime); tactics to excuse leaving work early, such as arguing with an adjacent operator or spilling something on oneself; prenotching blank cards by autoskipping them through a verifier so that, when punched, they will appear to have been verified; failing to correct errors when verifying in order to maintain a high keystroke average; and all the many forms of buck passing.

Average Operator

The source of all these problems is found in the operator herself. The average operator is female, between 18 and 40 years of age, married or divorced with children and has not completed high school.

She holds her job partially for its income and partially for the opportunity to make new friends or meet new boyfriends.

She doesn't worry about losing her job if she works in a town with a fairly large DP community since she can always find another.

Any job she holds take a doubtful second place to her family and other activities.

Once one understands this outlook, solving these problems becomes less difficult. One cannot alter the rate at which personnel assimilate instructions, but one can reduce the related problems by dividing the labor (thereby decreasing the number of jobs that any individual operator must master), keeping a careful check on new additions to the staff to ensure that they learn jobs correctly and maintaining constant supervision both to answer questions which arise and to discourage inactivity.

Supervision, Psychology

Improving the amount of the working day actually spent in working requires a combination of supervision and psychology. Unless only nonsmokers are hired, forbidding smoking in the actual keypunch/keytape area almost guarantees that the operators will take prolonged breaks throughout the day whether they smoke or not.

In most facilities, arranging smokers near air-exit ducts and away from both nonsmokers and any sensitive equipment will stop this excuse for inactivity and up the output noticeably.

Similarly, where restroom and telephone facilities are limited and inside the data entry area, more excuses for time loss are removed.

On the other hand, permitting operators to have coffee, water or some other beverage while working will generally prove advantageous.

Most operators will go to great lengths to protect their machines and keep this privilege, so little is lost except the time they would otherwise be spending to go to the water fountain.

Make Job Desirable

These seeming concessions both eliminate many excuses for not working and make a shop more desirable to the operator. Given them, operators will often work for slightly lower pay, especially if flexibility of working hours is an added incentive.

But these "concessions" have another and more ciritical value. In a shop which permits these comforts, operators will respond to stricter control.

Hard and fast rules can be established and maintained with minimal effort, and the firing of troublemakers or the rearranging of seating to reduce conversation will be accepted with good grace.

In a restrictive shop, operators who are fired for poor work, low output or disruptiveness take on the appearance of martyrs – and usually take a few of their fellow operators with them, by resignation, when they go.

In a more "liberal" shop, operators who are fired are rarely pitied and, even when they draw sympathy, the others are too content with their situation to willingly endanger their own jobs.

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An Open Letter to Gerry Larsen

Where Law Affects DP, Form Does Equal Substance

From a Legal Viewpoint

The following is an open letter to Gerald H. Larsen, author of "Not Form But Substance the Issue at 4th and Main St." [CW, Nov. 19], a reader commentary written in response to Roy N. Freed's "Definition of 'Software Program' Can Vary," which appeared in the Oct. 15 "From a Legal Viewpoint" column.

By Roy N. Freed

Special to Computerworld

Dear Gerry:

Thank you for your comments. It is always good to get feedback on one's observations. We need lots more of it, especially truly professional interaction.

Since we have an interplay going, I'm going to keep it up. My contribution to this round will be fairly brief. Maybe we can get others to join in. Let's try.

For now, I merely want to observe that, in many legal circumstances, form *is* substance, as shocking as that might appear at first hearing.

What that really means for our purposes is relatively simple – namely, that it is important to pay attention to legal ramifications and consequences (such as taxes, corporate law, tort liability and antitrust) in structuring transactions in the computer industry for their legal substance and to use carefully designed forms of language to reveal the genuine underlying legal substance.

More specifically, there simply is a significant difference between leases of goods and licenses to practice processes and between leases and either conditional sales or secured loans.

Good lawyers always respect substance over form. They would fail their clients if they did not. Hence, your own argument tended to corroborate your second moral. It seems as if we really have a straw man to contend with in our verbal jousting.

Economic Impacts Differ

In the real world, differences in legal approach – reflecting legal substance – can have substantially different economic impacts because we do have myriad legal rules based on classifications of transactions and properties and reflecting public policy. That is the fact we have to recognize and live with.

Carelessness in respecting that reality can have serious adverse effects. For example, Bunker-Ramo dressed up its stock market information service as a lease of a terminal and forced its customers to pay sales taxes on the entire charges. Sloppy form produced an unwarranted imposition on them.

In the same vein, would you deny the validity of the question of how, where the economic consequences are attractive, it is possible to include the cost of acquiring the use of a software program – whatever that term means – in the value of what is clearly Section 38 property in order to secure a federal investment tax credit based on that cost?

So object as you might, our legal structure does involve categories – many of them. It is the height of naivete to ignore that fact.

Regardless of our notions of proper sets of legal rules, we have to take a legal – rather than a theological – approach to the applicability of legal rules in the computer industry. Of course, any changes that might be made in the system would, of course, be applicable across the board to various technologies past, present and future.

Hence, we may ignore the present structure only at our peril while it prevails. One might be foolhardy with his own resources; a professional who is responsible, directly or indirectly, for the resources of others does not have that luxury. Ask your own lawyer.

In your book on computer contracting, you suggested that persons involved in acquisition transactions look to their tax counselors for guidance in that area. What do you think those counselors will say about income, tangible personal property and sales and use taxes? How long will they be in practice if they resort to moralisms rather than rigorous legal analysis of the natures and scopes of the various categories, including the relative amounts of taxes due in them?

Professional Pox?

That brings up a phenomenon that particularly requires the attention of all of us. Many computer specialists seem to believe lawyers are afflicted with some sort of professional pox. Your allegory might even reflect a hint of that notion.

For some time, computer specialists have been trying to "go it alone" in a do-it-yourself effort. "C-lawyers" have replaced the "sea lawyers" of the days of sailing vessels and seem to be bent on competing with jailhouse lawyers, but without the disposition of those others to work within the legal system.

It probably is time for a bit more legal humility or sensitivity on their part and a greater readiness to find out how the legal system really works. Those qualities will help to avoid lots of serious grief that otherwise is in store – until you reform the system in your model.

In this regard, I am glad you offered the "License Agreement for IBM Program Products" as a paragon of legal draftsmanship and a model of legal clarity. But even a superficial reading, let alone a careful analysis, of that form indicates to me that, contrary to your opinion, the term "program" *does* mean the media used to communicate the information-processing process or software program to the customer.

The paragraph entitled "Permission to Copy or Modify Licensed Programs" refers to "licensed programs . . . which are provided by IBM in printed form" and to those provided "in machine-readable form." Obviously, the latter are tapes and other computer media.

Since IBM undertakes to secure statutory copyright in the "writings" that reflect the software program, it thereby necessarily focuses in all transactions on the media and documentation as physical items in themselves.

But, as it turns out, its marketing approach is more similar to that of a cartoon syndicator, which furnishes mats and licenses copying by newspapers and other publications, than to a book publisher, which merely sells books and does not give any license to make copies. That's just basic copyright law.

Refer back to the agreement form. Its beginning statement expressly defined the term "licensed programs" to include basic material. As I suggested, the scope of the license granted, which occurs in the section entitled "License," is "to use the licensed program [which, as we see, means basic material] in any machine-readable form.

" 'Use' is defined as copying any portion of the licensed program's [again, read here "basic materials"] instructions or data from . . . media into the CPU for processing." Again, this is just basic copyright law.

Risky Business

Gerry, it seems as if ignoring present legal categories is a risky business. It can cost customers or suppliers real money needlessly or unexpectedly.

As an alternative, I propose developing a sensitivity to applicable legal rules and working with lawyers who are sophisticated about computer technology to apply them properly.

This involves the ability to assess the facts regarding computer transactions and properties accurately in light of the applicable legal rules and the readiness to characterize the facts carefully in written documents to try to achieve appropriate identified legal results. Remember that agreements frequently are scenarios to judges and tax collectors as well as communications means to contract administrators.

I find this type of interprofessional involvement is not only good professional practice but also good, clean fun.

Letters to the Editor

Debugging Suggestions

This letter is in reply to the various letters in *Computerworld* concerning the need for help in debugging Cobol programs, particularly core dumps.

For many IBM OS Cobol systems, the SYSDBOUT DD card, coupled with the "STATE" parameter in the EXEC card, results in an execution-time message which specifically identifies the verb causing the program check.

Also, a number of textbooks already assist in debugging Cobol core dumps, finding the data areas, etc. For IBM OS and DOS Cobol systems, I have found the following book very informative: *Standard Cobol*, 2nd edition by Mike Murach, published by Science Research Associates, Inc., this year.

Chapter 3 of this book shows exactly how to find data areas, DCBs, etc., in a Cobol dump, and although the OS example was not quite complete, most of my first-year Cobol students were able to follow it.

F. William Houghtaling

Raleigh, N.C.

Individual Mystique

Many years ago when I was young and all my programmers had cut their teeth on 1400 absolute, they did debug 360 Cobol from core dumps. Some of them even learned to patch object code and were able to avoid ever fixing source.

However, on my last two machines, all debugging has been from source and the only core dumps were to help the vendor find bugs in the compiler. Naively, I thought that this was progress and that I was doing the right thing.

I have been enlightened by Roger Poole's letter on debugging from core only and Jerrold Asher's contribution on the "programmer mystique" [CW, Nov. 12], each of which gained force by being placed next to the other.

Obviously, to be effective, the mystique must start with the individual programmer so that the manager can use it effectively against the outside world.

D.S. Owings

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User Builds Cobol System to Track Letter Handling

By Catherine Arnst

Of the CW Staff

MADISON, Wis. – Correspondence and requests at a life insurance company here are now assured rapid processing with a software program developed in-house.

"Call-Up" is used to keep track of the more than 3,500 letters that arrive daily at National Guardian Life Insurance Co., Spencer Francis, assistant vice-president and director of systems and data processing, said.

"The 'Call-Up' system helps prevent letters from being misplaced and ensures that requests are answered promptly," he added. "Formerly, they might have been bottlenecked at someone's desk."

The system, consisting of six programs, took the company's seven-person DP staff about a year to develop and has been operating since June.

They received no outside help because "nothing was available to do what we are doing," Francis said. "Call-Up" is written in ANS Cobol and operates under DOS, using under 10K of memory.

Letters arriving at the company are assigned a unique file number and sent to the proper department. That routing is logged into an IBM 370/135.

The department processes the request and returns the letter to the records department with a follow-up date (if necessary) which is also entered into the computer.

A daily list of files requested by all the departments is then printed out so that records can be properly routed.

Another report also lists files required by departments the next day, files needed but not in the filing department (and current location); files in a department more than a week and files inactive for 15 days and ready for deletion.

"Departments don't always return files before the follow-up day, but the system tells us who had it last and how long he's had it," Francis said.

"A folder stays on the 'active' list until the appropriate department completes a transaction and is satisfied that the request is completed."

On-Line System

The system is on-line, so all departments have visual display terminals available with access to policyholders' files. Questions can usually be answered from the information on the terminal without having to locate the physical file.

National Guardian's goal is to respond to letters on either the day of receipt or the following day, Francis said.

An "eight-day" report is generated showing files that have taken more than a week to process and are still open, which goes to department managers so they can pinpoint the reason for the delay.

Other reports itemize number of days required to complete transactions, case load by department and clerk and a list of steps taken in responding to a request.

Problems with the system have been minimal. "It took a long time to get the people comfortable with the system and able to use it efficiently," Francis said.

But "the time savings have been substantial, and it's eliminated huge piles of work," he continued. "It also creates a lot of good will with our policyholders," he said.

Keydata Unveils System Updates

WELLESLEY, Mass. – Business organizations in the U.S. and Canada seeking remote-computing services rather than in-house development have three application systems and a high-speed terminal option from Keydata Corp. to consider, in addition to any other alternatives.

Keydata's Series III services include an on-line financial reporting system, an on-line inventory management system, an on-line accounts receivable system and the high-speed terinal option. Users may pick just those parts of Series III that suit their needs, the vendor emphasized.

Described as an extension of Keydata's accounts payable/general ledger system, the financial reporting service enables users to have "any number" of financial reports designed on a custom basis.

It also provides on-line "what-if" capability for management analysis of such reports, the company added.

The inventory system is said to analyze recent sales patterns and current vendor lead times, together with forecasted sales, to indicate periodically when the user should buy an item and in what quantity.

Use of this system should "sharply increase" a user's inventory turnover, thereby optimizing investment, Keydata said.

The recently announced accounts receivable system "greatly enhances" the capabilities Keydata previously had in this area. It is said to provide users with continuous real-time information of the status of receivables, current with the last transaction entered into the system.

Data can be displayed on a "television-like" screen in the user's office.

Users with high volumes of printouts from Keydata services should be able to cut terminal costs by moving to the new unit Keydata is offering, a spokesman said.

The device prints at up to 120 char./sec, four times faster than units previously available from Keydata.

The higher speed might well mean a user could get all his work done with fewer terminals. Despite the higher cost of the new unit, the net effect could be a significant savings, the vendor said.

Keydata is headquartered at 20 William St., 02181.

DOS Library Routines Mimicked, Outperformed by SDI's 'Fleet'

By Don Leavitt

Of the CW Staff

BURLINGAME, Calif. – Increased program security, simplified program maintenance and faster processing of library control functions are among the advantages cited by Software Design, Inc. (SDI) for use of its Fleet software in IBM DOS and DOS/VS installations.

The SDI package includes programs which match the functions of IBM's CSERV, RSERV, SSERV, MAINT and LNKEDT routines, but with "10 times faster performance," the vendor said.

Fleet also includes features not found in the standard IBM service programs, the spokesman added.

Fleet programs, for example, carry out "extensive" security checks to minimize the chance of defective libraries being handled and provide warnings – which the operator cannot easily bypass – if libraries are inadvertantly damaged.

Equally important with speed and new capabilities, however, is Fleet's ability to provide these enhancements while working with IBM standard libraries, SDI said.

All components, therefore, remain accessible to the standard IBM support programs – if there is ever any question about Fleet's processing – and source statement books can be retrieved by the DOS or DOS/VS compilers.

Existing jobstreams using the standard service programs produce identical logical results when converted to use Fleet, the vendor added.

Fleet programs produce output that is in standard unblocked, 80-column output or optionally in 1,600-byte blocks on magnetic tapes with standard labels.

Support for moving disk files to tape, including the dropping of all deleted records, not only provides fast backup/restore capabilities, but support conversion from one type of disk to another, the spokesman added.

Fleet incorporates an enhanced version of SDI's previously available Fmaint package. Though Fmaint itself will no longer be newly installed, technical support for existing users will continue.

Fleet costs $225/mo, which would result in a typical net savings of just over $1,000/mo compared with the cost of using IBM-provided programs, according to an SDI calculation.

SDI is at 880 Mitten Road, 94010.

'Robot' Eases Links With DBMS

KENSINGTON, Md. – While a number of report generators have been interfaced with data base management systems (DBMS), a software product called 'Robot' appears to go even further.

It translates English language requests into terms a DBMS can handle and translates the DBMS's response into English, according to the vendor, Artificial Intelligence Corp. (AIC).

Robot is compatible with any computer that has PL/I run-time support, including IBM 360/370s, and "can be used to drive all commercially available DBMS," the company said, noting that most of its demonstration runs have used Software AG's Adabas.

The package is a pre- and postprocessor designed to allow clerks and managers from user departments to express what they are seeking from the data base in their own terms rather than in the somewhat restrictive terms of a computer language.

Robot includes a dictionary which leads into the user's data base, a transition network grammar and a semantic interpreter. With this combination of tools, Robot parses the user's English request and maps the formal representation into the syntax of the DBMS command language.

The DBMS works with the data, determines the answer to the request and turns it over to Robot, which in turn converts it into English and displays it on a line printer or CRT-based terminal.

The user's DP department or data base administration staff is likely to help in creating the dictionary and semantic interpreter within Robot.

Therefore, the system is able to work out implicit linkages to data fields even when they have names different from the ones used in the request and even if qualification phrases are not absolutely as expected.

Designed to run in 140K bytes without overlays or 80K with them, Robot can be acquired for a one-time fee of $30,000 or $1,300/mo for two years.

It is also available on the Computer Network (Comnet) Corp. remote-computing network, an AIC spokesman said from 3514 Plyers Mill Road, 20795.

Musing of a DP Manager

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Interdata Multitasks 16-Bit Minis

OCEANPORT, N.J. – A multitasking operating system called OS/16 MT2 – from Interdata, Inc. – is said to optimize the use of the minimaker's 16-bit machines in real-time, program development and computational applications.

Upward-compatible with Interdata's OS/32 MT for its 32-bit machines, OS/16 MT2 is said to combine the major features of operating systems previously available for the 16-bit minis. It combines a command substitution system, multiple shared libraries, round-robin scheduling and file protection conforming to standards of the Instrument Society of America, Interdata said.

The control software includes task, memory and file management and convenient user interfaces, the vendor claimed.

User-written tasks with as many as 256 priorities are supported by the task management features. Intertask communications and task-handled traps are also provided.

Memory management is said to include a task establisher utility, partitioned memory, roll-in/roll-out and multiple overlay facilities. File management provides indexed and contiguous files and file protection.

The utilities include an edit routine, unspecified operating system aids, a library loader, copy capabilities and Itam/16 for data communications.

OS/16 MT2 is resident in 16K bytes of memory, supports all Interdata peripheral equipment and is available on cards or magnetic media.

Already released to selected field installations, it will be available for general distribution next month.

OS/16 MT2 carries a one-time charge of $1,400, Interdata noted.

Throughput Jumps, Costs Drop With Relational View of Data

By Joseph W. Schmitt

Special to Computerworld

GLEN ELLYN, Ill. – By adopting a relational view of data, Datad Corp. has cut its software costs, increased throughput, cut new development time to a fraction of its former span and cleaned up some fuzzy thinking in the process.

During 1970 and 1971, Datad found it was paying too much for software applications development. A large part of each project was devoted to defining file formats, writing the corresponding program code and writing specialized utility programs to edit, correct and otherwise manipulate the formatted data sets.

An in-house program was launched to develop a universal data set/program interface and provide one master set of utility programs for all data sets.

By mid-1971, the interface was working, and as much as 90% of the effort formerly required in developing new applications had disappeared.

The interface now handles all external data sets in Datad's system with several beneficial consequences:

- A single set of sophisticated utility programs now handles all data management, updating, rearranging, perusing, correcting, controlling, etc. for all present and future datasets. Functions such as FIND, MOVE, PRINT (selected items), SET, CREATE, etc. are invocable from an interactive terminal.
- Data sets can be dynamically redefined without upsetting any programs.
- Redundant code of nearly all I/O functions has been eliminated. Programming a new application consists almost wholly of writing the logical steps of the application.
- Analysts pass the data definition stage of an application much more quickly than in the past because data elements can be added or deleted without calling for reprogramming.

Transparent to User

File formats and storage locations are transparent to the user. All data is stored and referenced in named tables with named columns. All names are defined and assigned by the user.

The system has inquiry, computational and report-writing capabilities. It has been used to do sales forecasting, order entry, corporate accounting, financial statements and investment portfolio recordkeeping and reporting.

With hindsight, Datad realized in 1973 that this is a full-fledged data base management system (DBMS) although that was not the original goal.

Specifically, it is a relational DBMS, because the original interface was designed to handle tables of data with named columns.

Each column in a table is a set of fields for a specific data element; and each row of data is an aggregate of data element values representing an item or an event.

Early apprehensions over possible limitations imposed by viewing all data in tabular form have evaporated. No application has yet been found which could not be handled, and in more than one instance an application has actually been enhanced by the discipline imposed upon it during the tabularizing process.

The theoretical work of E.F. Codd at IBM on relational data bases lent further support to Datad's assessment of its own experience. Access path anomalies and certain data deadlocks are eliminated.

Datad's system is written in PL/I and implemented on the Service Bureau Co.'s remote-computing network under the Call/370 service.

Schmitt is president of Datad Corp.

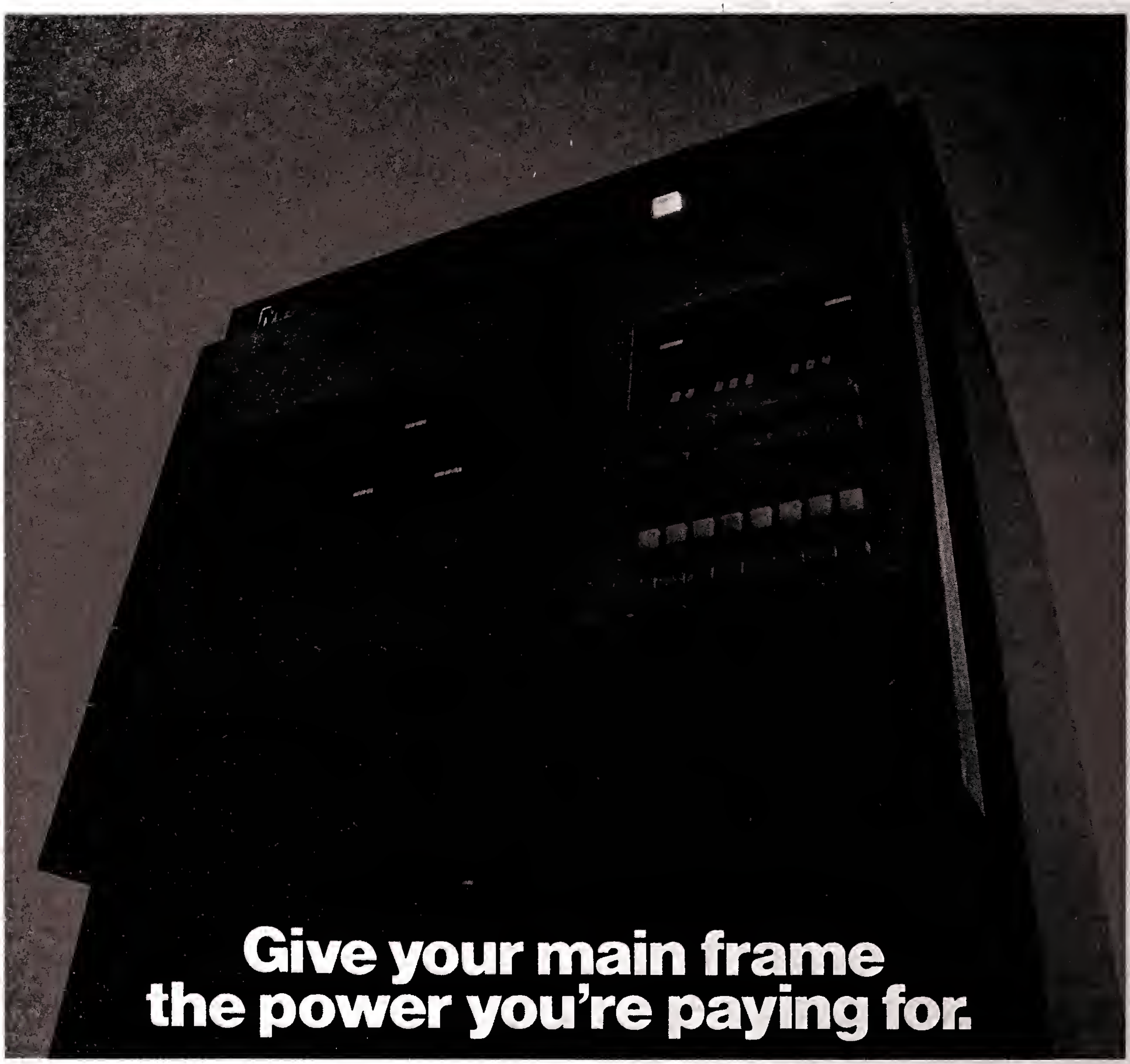
'Adabas' Subsystem Aids BOM Processing

RESTON, Va. – Bill of Materials (BOM) processing built on files under the Adabas data base management system is supported directly by the Adabas Bill of Materials (Adabom) subsystem available from the Adabas vendor, Software AG.

Calls to Adabom allow the user to access and maintain pertinent files without creating retrieval and update logic in each application.

The user's BOM data base may contain any number of interrelated files, Software AG noted, but two are essential: one on product structure, the other on parts.

Adabom logic is provided free for now to any user of the $120,000 Adabas software, the vendor noted from 11800 Sunrise Valley Drive, 22091.



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'Not Just Another Product'

DBMS Forces Change in Approach to Problem Solving

By Nancy French
Of the CW Staff

TORONTO – Data base systems are much more than just another software product, they represent a completely new way of developing systems, according to Pat Nichols, manager of data base/data communications services for Datacrown Ltd.

Data base requires a new philosophy – a new way of organizing data, a new way of designing applications and a new role for end users, she said.

Rather than basing inputs and systems on the type of outputs the user needs, which is the approach taken by the traditional systems developer, the systems analyst's first step under data base is to identify the data that is needed to solve the user's problem, she explained.

Once that is defined, the systems analyst determines how much of that data is currently available in the company's existing data bases.

Then data not currently available will have to be captured, not as part of any given application system, but rather as part of the company's data maintenance system to be used for all applications, she explained.

Two Types of Systems

There are really two types of systems in a data base environment: data maintenance systems, which process transaction inputs and update data bases for shared use, and information systems, which utlize the data available to produce the outputs required to satisfy user requirements, she said. There is no direct relationship between these two types of systems, she added.

In a data base environment, data bases will be designed based on "entities" within the business creating "families of data" concerning such things as employees, products or customers, for example. This data will serve all applications, she explained.

"There is a one-for-one relationship between data bases and systems; this is completely different from a conventional approach where files are designed to serve a single application."

Traditional systems development requires that transaction inputs be designed for a single system, with data often collected more than once to satisfy several systems.

"Now, inputs actually have a value of their own," she emphasized. Under the traditional approach, considerable data redundancy can be found between files.

Systems are designed for individual efficiency rather than for general efficiency.

Further, because the user has but one chance to specify his needs for a system he knows he must live with for four or five years, he asks for the moon, Nichols said.

Data base eliminates all these shortcomings and offers other advantages as well, she said.

Query languages and report writers provided as part of DBMS software handle many chores, eliminating the need for new application programs, she said.

In addition to dramatically reducing application development costs, these facilities reduce the need to predefine specific outputs and permit many requests to be handled on an ad-hoc basis, she noted.

Data Basics

Difficult to Quantify

Most companies will want to make the decision to move to data base management systems (DBMS) based on a cost-benefit analysis, she said, but "while the costs are quite clear and can be quantified, the benefits are largely dependent on the particular DBMS and are difficult to quantify.

At the conclusion of her presentation at the recent Canadian Computer Conference, she warned that, in addition to assessing the cost and benefits, there are many pitfalls of which a company must be aware.

First, technical support costs are usually underestimated. Supplementary software products are often required with many DBMS, she added.

Further, there is a shortage of personnel skilled in this new approach. Also, most vendors cannot predict operating costs in advance of implementation, and, finally, the DP department often finds itself diverting resources from application development to supporting the software, she explained.

'Utotal' Reorganizes, Reloads Data Bases

MILWAUKEE – IBM OS/VS installations using Cincom Systems' Total can load, unload or reorganize data bases through simple keyword control cards with the Utotal utility package from DASD Corp.

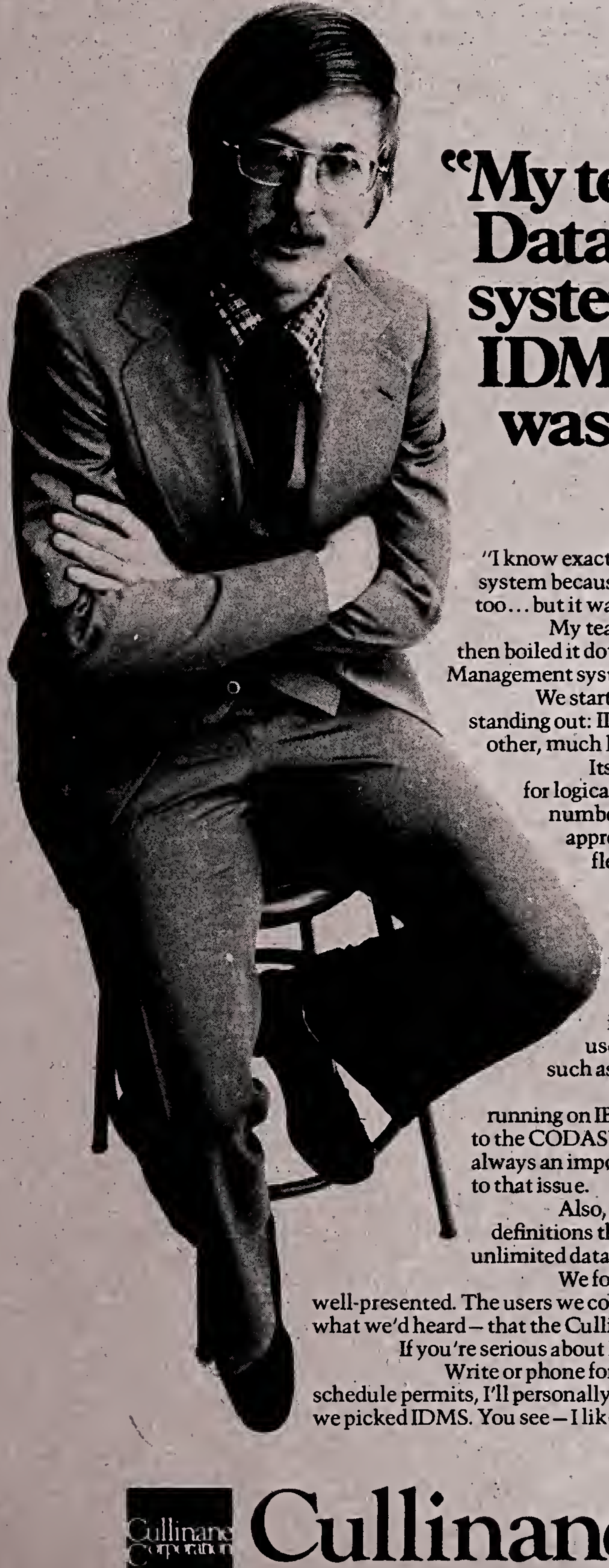
When more space is needed, DASD explained, Utotal may be used to unload a data base and then reload it under a new DBGEN. When used as a regular backup/restore facility, Utotal reduces both CPU time and disk space because only active records are copied, the vendor continued.

Access efficiency is improved after Utotal is used to reorganize Total variable files, a spokesman claimed. The reorganization process puts these files in physical and logical sequence and places records having the same Primary Chain within the same physical block.

The keyword parameters used to activate Utotal capabilities are in a format consistent with IBM's OS/VS utilities.

Requiring 48K bytes of memory, Utotal is delivered in object form for what the vendor called a "bicentennial price" of $1,776.

DASD Corp. is at 8707 N. Port Washington Road, 53217.



"My team evaluated every Database Management system going. We picked IDMS and the choice was easy. Here's why."

William Casey

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We started out completely impartial. But from the first one system kept standing out: IDMS. It offered many features that simply weren't available on other, much larger, systems, yet it had an overhead figure of only 50 K.

Its variety of data placement techniques, its unrestricted facilities for logically relating all data under its control, its provision for an unlimited number of database entry points, and its superior space management approach amounted to both a substantial performance edge and a flexible database architecture advantage.

With data independence established by means of separate schema and subschema compilers, we realized that many applications programs would no longer depend on data definitions they themselves employed.

From a programming point of view, the system was miles ahead of its competition. Example: IDMS's DML processor inserts all necessary data record descriptions directly into the user's COBOL program and allows use of database-oriented verbs, such as FIND, OBTAIN, or STORE.

We were pleased to find that IDMS is the only system currently running on IBM (OS and DOS) and Univac Spectra equipment that corresponds to the CODASYL DBTG specification of April 1971. Machine independence is always an important consideration, and IDMS represented the perfect answer to that issue.

Also, the IDMS/CULPRIT retrieval system, running from the same data definitions that the user established to create his database network, provides unlimited database access facilities for reporting purposes.

We found the documentation was beautifully done – complete and well-presented. The users we contacted were most enthusiastic about the system and confirmed what we'd heard – that the Cullinane Corporation has an outstanding reputation for support.

If you're serious about Database Management you have to look seriously at IDMS.

Write or phone for a technical brochure or call me, William Casey, and if my travel schedule permits, I'll personally show you exactly how we compared the various choices and why we picked IDMS. You see – I liked IDMS so much I joined the Cullinane Team.

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Pinpointing Problems—Part I

SMF Data Valid for Billings But Bad for Measurement

By Aso Tavitian

Special to Computerworld

According to IBM's manual, GC35-0004-5, System Management Facilities (SMF) is "a feature of OS/VS that provides the means for gathering and recording information that can be used for billing customers or evaluating system usage."

Customer billing, one of these functions, requires repeatability and accurate measurement of the resources used by a given job/step.

Performance Evaluation

How well the wealth of information gathered by SMF is used to prepare customer's bills depends on the sophistication of an installation's accounting system as well as the degree of inaccuracy deemed acceptable by the installation.

Since SMF provides incomplete or inaccurate information about the use of some resources (e.g., CPU time, channel time), particularly on the job/step level, it is often necessary to sacrifice some accuracy or completeness for the sake of repeatability.

Evaluating system usage, the other major function of SMF, requires closer examination. The SMF manual discusses how information gathered by SMF might be "used to measure system usage against departmental standards of efficiency and performance."

SMF does provide information which can be used to draw some conclusions about efficiency and performance; however, SMF leaves much to be desired as a performance measurement tool, particularly on the job/step level.

The most frequently measured parameters when the performance of a program is examined are elapsed time, CPU time, channel time, device-busy time and disk-space utilization.

The total CPU time of a program consists of two components: problem state and supervisor state.

SMF provides a number of different record types with its own format and purpose. Record Types five and four contain information about the CPU utilization of a job/step respectively. This information, referred to as "CPU time" in the SMF manual, is printed at the completion of each job/step and is labeled "CPU" on the outputs produced by the system.

This SMF-recorded time contains the entire problem-state CPU time and a fraction of the supervisor-state CPU time. Thus, it does not accurately represent the true total CPU utilization of a job/step.

Erroneous Conclusions

Since the fraction of the true CPU time it represents varies not only with various system configurations, but with programming techniques as well, the use of the SMF-recorded CPU time for measuring CPU utilization can lead to erroneous conclusions.

This would be particularly true for programs which have high supervisor-state CPU time. For instance, the significant amount of supervisor-state CPU time used for translating the CCWs when ECCP instead of EXCPVR is used in a VS environment will not be reflected in the SMF-recorded CPU time.

Thus, the true total CPU time of a program issuing many I/O operations in a VS environment and not using EXCPVR will be much higher than the SMF-recorded CPU time. IBM's reason (given in private correspondence), for the inaccuracy of the CPU time reported in SMF is the attempt to make SMF "somewhat reproduceable."

In addition to collecting CPU time in record Types five and four, SMF collects the CPU wait time in record Type one. "This record," explained the SMF manual, "is written at SMF initialization and at first job/step termination following the expiration of a 10-minute interval of elapsed system time. It contains the CPU wait time accumulated during all of the 10-minute intervals that expired between two step terminations."

If a program was executed in a dedicated environment and the CPU wait time accumulated for the duration of the job/step was known, its total CPU time can be calculated by subtracting the CPU wait time from the elapsed time.

However, SMF does not record the CPU wait time in relation to a particular job/step. As already mentioned, it is accumulated for one or more 10-minute intervals.

Thus, a Type one record may contain CPU wait time corresponding to the program whose total CPU time is being measured as well as some CPU wait time accumulated prior to and subsequent to the execution of the program.

To determine the portion of the CPU wait time accumulated during the execution of the program, the rate at which CPU wait time is accumulated prior to and subsequent to the execution of the program would have to be known.

A further complication arises when the CPU wait time corresponding to the program is spread over two Type one records. Termination of the program will trigger creation of the first Type one record.

Creation of the second Type one record can be triggered by executing a short test job (e.g., IEFBR14) 10 or more minutes after completion of the program. Again, the rate of CPU wait time accumulation during these 10 or more minutes would have to be known.

If additional measurements are to be made, the CPU wait time of the test job will appear in subsequent Type one records combined with the CPU wait time of the next measurement.

To separate the CPU wait time for subsequent runs, the CPU wait time accumulated during execution of the test job would have to be known.

In short, while SMF's Type one records can be effectively used to measure the CPU usage of an entire multiprogramming system for a period of a few hours, they are unsuitable for measuring the total CPU usage during the execution of a short job/step. The use of record Type one for such purpose would be particularly unfeasible when the total CPU time of 20 to 30 different jobs (not unusual for a thorough evaluation of two products) is required.

The underlying reason for the difficulty is that SMF's record Type one was never meant to be used in measuring the total CPU time of an indiviudal program.

In Part 2, Tavitian will outline SMF's handling of channel time, device-busy time and disk-space utilization.

Tavitian is president of Whitlow Computer Systems, Inc., in Englewood Cliffs, N.J.

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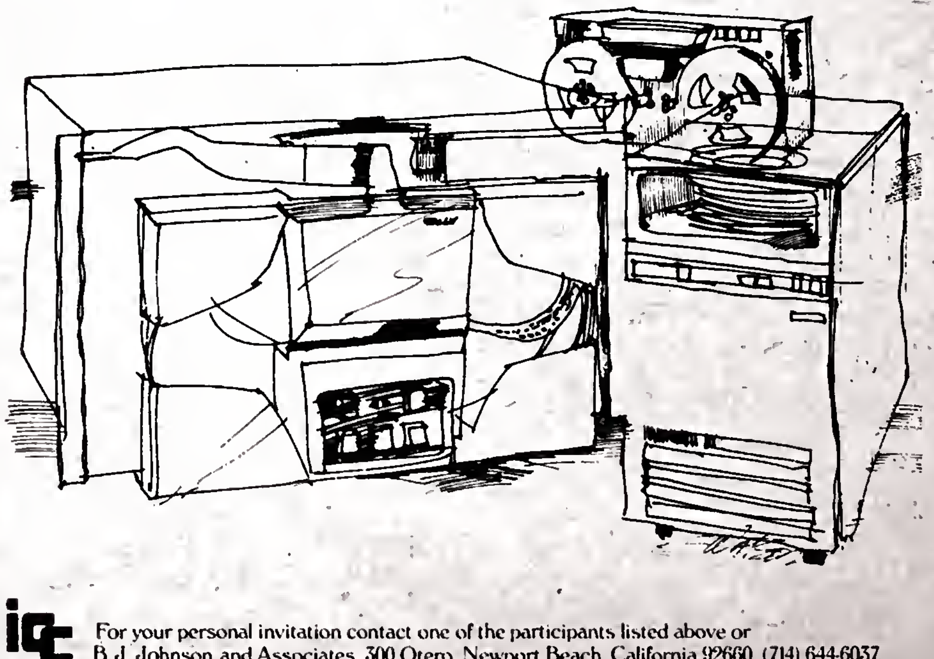

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Vendor Keeps Operating Histories

Maintenance Center Keeps 700 Terminals on the Air

By Ronald A. Frank
Of the CW Staff

NASHUA, N.H. – A maintenance control center at Sanders Data Systems is helping to keep more than 700 terminals and other equipment at 300 customer locations on the air.

The center uses a self-contained Sanders 8100 DP system to maintain a data base of about 2,000 records on the operating and maintenance history of each terminal in the field.

Most of the calls coming into the maintenance center are related to equipment problems but, as an operational history is built up on each device, it is possible to anticipate malfunctions and perform preventive maintenance, according to Dave Hendricks, supervisor of field engineering support.

The control center began operations in 1973 with only a few terminals to monitor. Today it maintains close contact with 50 Sanders field offices, in addition to the customer sites.

In the past year, there has been a significant drop in the amount of service calls per month. Hendricks attributed this to the preventive maintenance initiated by the control center.

One year ago the rate of service calls was about 450 per month while it is now about 300 per month. And this reduction has taken place despite the fact that an ever-increasing amount of equipment is being tracked by the center.

The net result of this improvement is that the company is now keeping more equipment operational a greater amount of time with fewer field service representatives, Hendricks said.

The center attempts to achieve an average response time of four hours for trouble calls originating from customer locations that are within 50 miles from the nearest Sanders field maintenance office. In some cases, when a customer calls into the center on the toll-free In-Wats lines, one of the operators can help solve the problem on the spot.

If this is not possible, the nearest field office is alerted and the problem is described. A maintenance representative is then dispatched to the site and the center is contacted when the representative arrives.

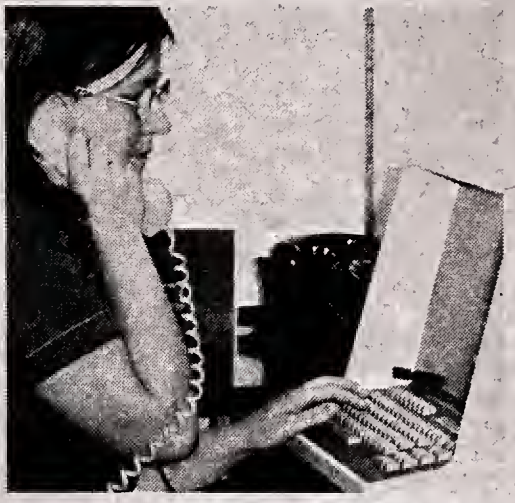
All repair and maintenance data is logged onto Sanders 860 CRTs at the center and the information is then entered into the data base. In the event of serious problems, the operators at the center can put the field representative in touch with engineering specialists at the main Sanders facility here.

The engineers then work directly with the representatives at the customer site, but the operation continues to be coordinated by the control center. All pertinent data continues to be logged into the files of the equipment that has malfunctioned.

Network Maintenance

For larger customers with nationwide networks, the Sanders center is connected directly into the system. In one such case,

(Continued on Page 20)



CW Photo by R. Frank

Carol Kerr, group service coordinator, logs in terminal trouble report.

Codex LSI Modems Feature 'Gearshift' Capability

NEWTON, Mass. – Codex Corp. has introduced a line of eight LSI modems, designed for high-speed applications, that feature a "gearshift" capability which allows equalization at a lower speed followed by an automatic shift up to a higher transmission speed.

Diagnostic and monitoring features have also been expanded in the LSI modems, Codex said.

For point-to-point applications, the LSI 9600, LSI 7200 and LSI 4800 operate at 9,600-, 7,200- and 4,800 bit/sec for full-duplex operation over Bell 3002 or equivalent voice-grade lines. These units have compatible modes that permit on-line operation with the earlier Codex 9600C, 7200C and 4800C modems, but are said to have higher performance and enhanced diagnostic features.

The point-to-point models have improved automatic equalizer operating performance and a wider range of fallback speeds, the firm said.

In multipoint applications, the LSI 96FP, LSI 72FP and LSI 48FP Fast-Poll Multipoint units provide 9,600-, 7,200- and 4,800 bit/sec speeds on the outbound master side in polled networks.

An inbound automatic gearshift mechanism permits inbound poll responses to begin at 2,400 bit/sec and automatically shifts both master and slave modems up to 4,800 bit/sec if the length of the response message makes the use of that higher speed necessary.

The result is a 9 msec response time for all messages with an effective inbound throughput of 4,800 bit/sec. Line equalization can be accomplished in 27 msec at 2,400 bit/sec compared with 50 msec at 4,800 bit/sec, a spokesman said.

The LSI 48I international model operates at 4,800 bit/sec and is compatible with CCITT V.27 specifications. Strap selection of standard fast train modes also provides multipoint operational capability.

The LSI 48D 4,800 bit/sec dial-up model has an initial equalization time of 180 msec and 50 msec line turnaround for operation in half-duplex, two-wire configurations.

The LSI series' network management capabilities include the Circuit Quality Monitoring System (CQMS) and the Multipoint Network Control System (MNCS).

The CQMS will cost "under $5,000" and combines five different network monitoring and diagnostic functions, Codex said.

The MNCS provides system monitoring, diagnostic and reconfiguration capability for use with Codex LSI multipoint modems in dedicated polled applications.

Prices for the point-to-point units start at $8,500 for the LSI 9600, $6,500 for the LSI 7200 and $4,325 for the LSI 4800, with two-year leases at $185/mo, $150/mo and $95/mo respectively.

The multipoint models cost $8,750 for the 9600 FP, $6,725 for the 7200 FP and $4,500 for the 4800 FP. Two-year lease rates are $200/mo, $160/mo and $105/mo.

First deliveries of the point-to-point models are scheduled for the first quarter of 1976. The multipoint modems will be available in the second quarter from 15 Riverdale Ave., 02195.

Recession Not Affecting Salaries

NEW YORK – The recession has had no noticeable effect on the long-term upward trend in salaries being paid to telecommunications specialists, an annual telecommunications salary survey done by Personnel Resources has found.

The typical telecommunications employee received an increase of about 10% so far this year, which was not enough to keep pace with current inflation rates. But those in the $20,000 and over category probably received a smaller percentage increase and also had greater difficulty in finding new employment, according to the survey.

Those in the over $30,000 bracket found few openings during the year, the survey showed.

Among the specialists "in very short supply" are engineers with data transmission and microprocessor experience and real-time message-swtiching programmers. The survey said there are "multiple openings" for corporate telecommunications analysts and managers at the moment.

Salaries for message-switching programmers range from $13,000 to $16,000; for senior telecommunications programmers they range from $15,000 to $19,000, the survey found.

Communications managers were listed in the $19,000 to $27,000 range. Analysts with some data communications experience had a salary range from $15,000 to $19,000.

Salaries in the New York City area were somewhat higher than national averages in all categories.

Personnel Resources said the salary information represents the "mid-50% of data" which it collected from about 800 persons working in the telecommunications area. Copies of the survey are available from the company at Suite 1234, 342 Madison Ave., 10017.

Datapro Salutes the Software Winners!

Here are the top 25 software packages out of 1,400 as determined by user ratings in Datapro Research Corporation's 1975 survey of 26,000 computer system users.

1975 Datapro Software Honor Roll

ALLTAX Management Information Service
ASAP Universal Software, Inc.
Disk Utilities Westinghouse Electric Corporation
DYL-250 Dylakor Software Systems, Inc.
EPAT Software Design, Inc.
Fast Dump Restore Innovation Data Processing, Inc.
Foresight Foresight Systems, Inc.
1130/FORTRAN DNA Systems, Inc.
GRASP Software Design, Inc.
IMSL IMSL, Inc.
KOMAND-DAS Pace Applied Technology, Inc.
The LIBRARIAN Applied Data Research, Inc.
Optimizer/Optimizer II Capex Corporation
PAN*SORT Pansophic Systems, Inc.
PANVALET Pansophic Systems, Inc.
PPE Boole & Babbage, Inc.
Quikjob I, II, & III System Support Software, Inc.
RELO-PLUS Universal Software Inc.
RPG II IBM Corporation
1130/SORT DNA Systems, Inc.
SYNCSORT Whitlow Computer Systems, Inc.
UCC ONE (TMS) University Computing Company
UCC TWO (DUO) University Computing Company
WATFIV University of Waterloo
WESTI Westinghouse Electric Corporation

The complete user ratings of these and 35 other specially recognized packages, plus the results of the entire survey are available for $10 in Datapro's new report, "User Ratings of Proprietary Software."

☐ Here's my order for the report "User Ratings of Proprietary Software."
☐ $10 check enclosed ☐ Bill me, add $2 handling

☐ I'd also like information about Datapro's new Directory of Software which describes these 25 packages and thousands of others.

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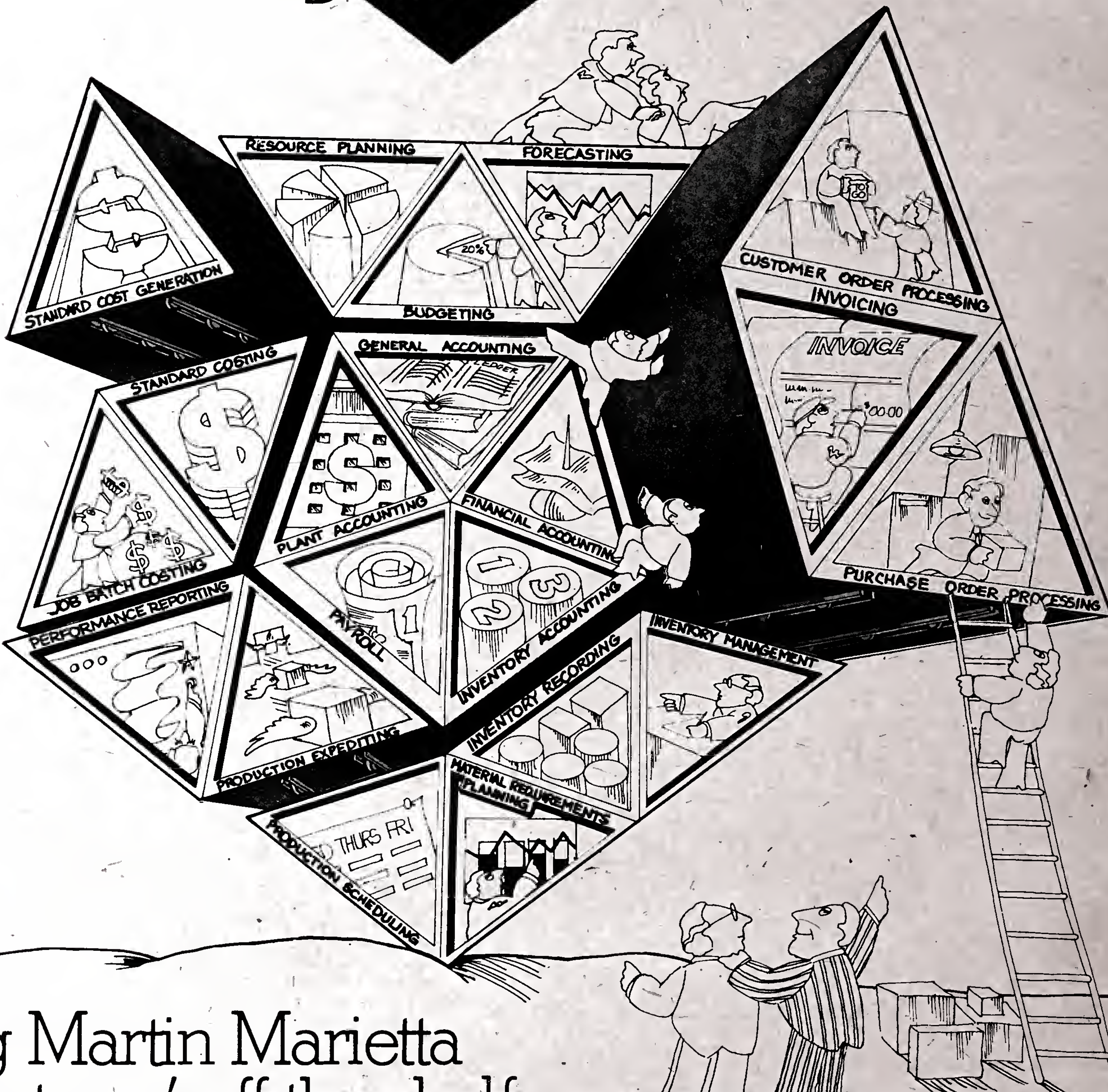
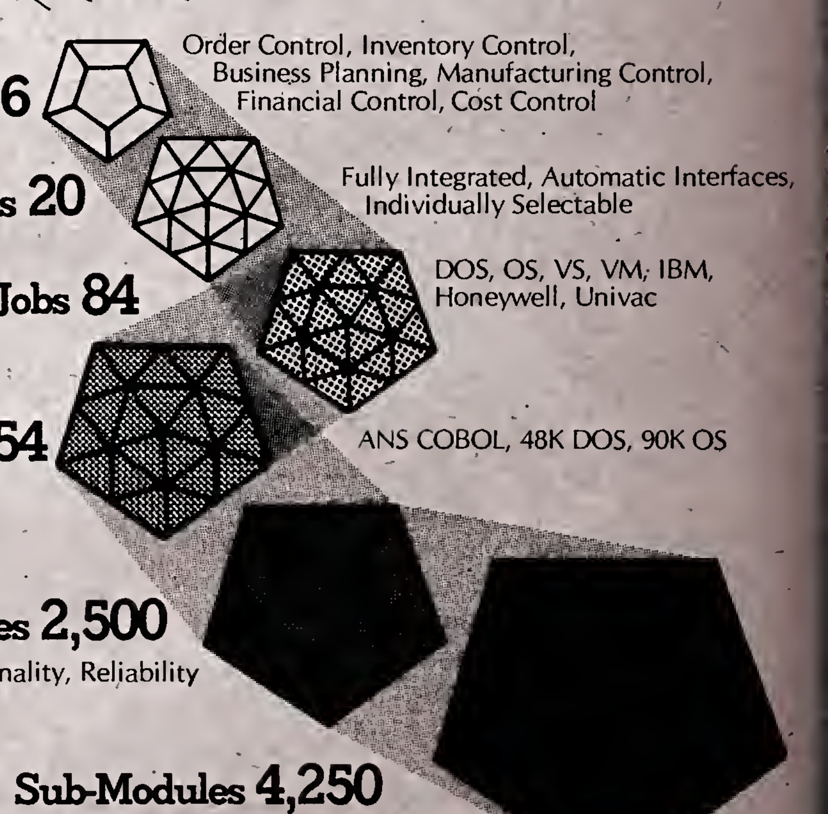
ComputerSystems

Using MAS Modules



Using Martin Marietta Data Systems' off-the-shelf **Modular Application Systems** (MAS), you can have the system of your choice on exceptional terms:



Systems 6 Order Control, Inventory Control, Business Planning, Manufacturing Control, Financial Control, Cost Control

Elements 20 Fully Integrated, Automatic Interfaces, Individually Selectable

Jobs 84 DOS, OS, VS, VM, IBM, Honeywell, Univac

Programs 254 ANS COBOL, 48K DOS, 90K OS

Modules 2,500 Efficiency, Commonality, Reliability

Sub-Modules 4,250 Standard Routines, Ease of Maintenance, Non-Redundant Code

A system to your exact specification

Our "Modular Application Systems" are complete business systems built up from small modules. You can run them on your own computer, or on our nationwide computer power network. The distinctive structuring permits simple tailoring of the systems to your exact specification. Performance is not sacrificed in redundant code; yet the system fits you like a glove.

You can use a module, a program, a job, a system or a selection of systems. Install them in any sequence, in a standard or customized manner—they'll fit together to provide a completely integrated system that fits you now *and*

grows with your business

as your business needs change. Paradoxically, our customized off-the-shelf system is going to fit you better in years to come than a specially built one: because our system is deliberately made to flex. The data and transaction structure of our system is designed to reflect a fundamental view of the resources and activities to be planned and controlled. This ordered model of the business is the key to subsequent alteration and audit of systems behavior in line with your company's development. So the system will fit vou now and grow with your business.

Proven in over 500 implementations

Over 500 MAS systems have now been installed in the U.S. and Europe. One-shot systems' development is often, by nature, a prototype development with all the difficulties of original work: cost overruns, schedule delays, failure to produce results, subsequent temperamental behavior.

SYSTEM	ELEMENTS IMPLEMENTED	"STANDARD" MAS DELIVERY	"CUSTOMIZED" MAS DELIVERY
		Weeks	Weeks
Inventory Control	170	3	16
Cost Control	25	2	10
Order Control	34	2	10
Manufacturing Control	60	2	12
Financial Control	176	3	15
Business Planning	45	2	10
	510	2.3 Average	12 Average

performance honed to a fine edge

The MMDS MAS range was built in 1967/1968, with a completely new Version 2 released in 1972/1973. You know the systems will work; that they'll produce the results; and that the anticipated interaction will be there when you want it. You know the input documents are usable, the controls extensive and the reporting responsive to your needs. And you know the systems performance has been honed to a fine edge in the 500 implementations; the customizing facility giving nothing away in performance or fit.

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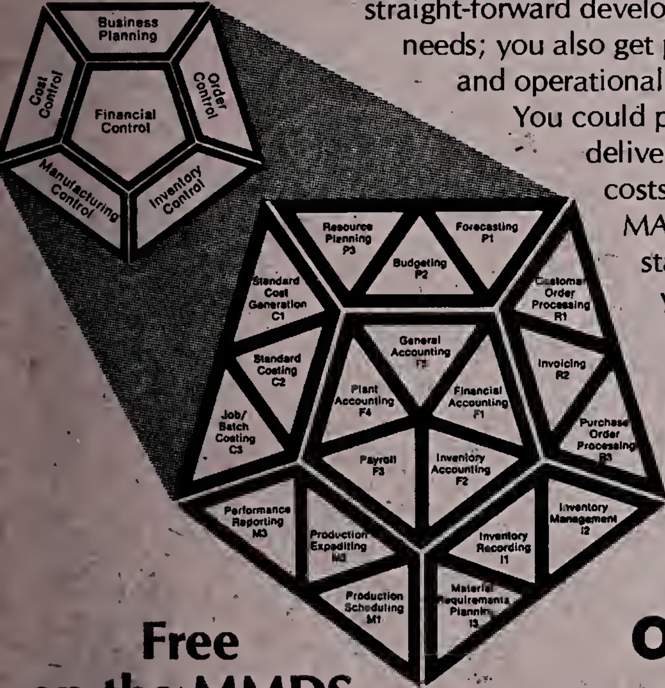
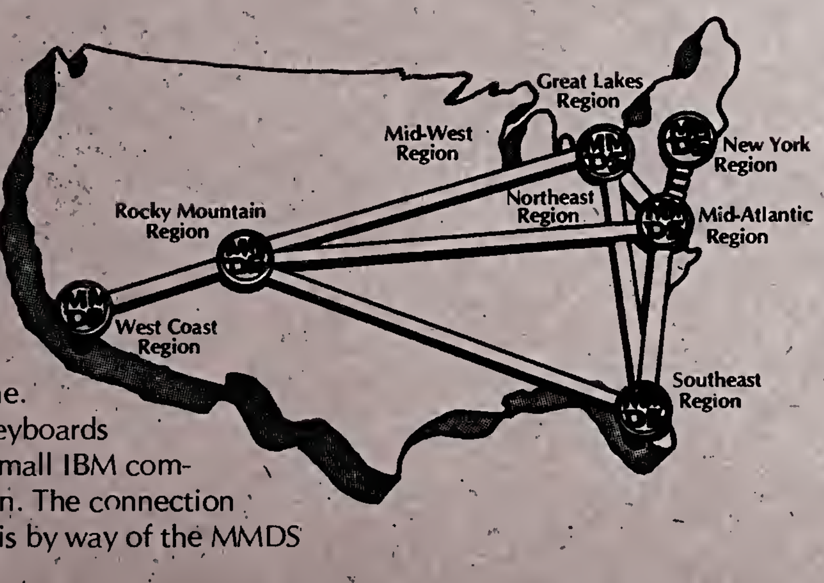
You get the exact system you specify, with special internal structure to permit straight-forward development in line with your business needs; you also get proven, demonstrable performance and operational efficiency honed to a fine edge. You could pay a lot for that sort of assured delivery and pay-off. Home built code costs typically $6 to $10 per statement. MAS code goes at $1 per statement, standard. If you want it customized, you might push this up to $2 per statement. An 85% to 90% savings at best. Highly customized: a 65% to 80% savings. For systems that are better than home built, and can be delivered tomorrow.



delivery off-the-shelf

Free on the MMDS RJE Computer Power Network

Through a Remote Job Entry terminal, you can utilize the power of Martin Marietta Data Systems' IBM 370/168 computers. You handle the RJE terminal card reader and printer as you would your own machine. You can use video display keyboards instead, add tapes or use a small IBM computer at the terminal location. The connection back to the #168 computers is by way of the MMDS network—intermixing high and low speed lines. Users of the network have no cost access to the MAS range. The straight-forward nature of the systems, their ease of use coupled with the convenience of a single source, dedicated business system service—available on low cost terminals to sites anywhere in the U.S.—makes for a particularly attractive arrangement.



a complete business system service.

Martin Marietta Data Systems

Martin Marietta Data Systems builds and runs computer systems: custom systems and off-the-shelf MAS. Our emphasis is on providing well thought-out products and services in a reliable and economic fashion. Our RJE terminal service, the 370/168 computer centers and linking network, and the MAS product ranges are all directed to this end. We seek the best people in the computer services industry and we provide them the tools with which to do an efficient job. These software tools and methodologies are proven commercial successes in their own right—SDM, a Systems Development Methodology; Testmaster, a modular programming test harness; Tablemaster, for decision table processing; and HSL 1, a systems analysis language.

These are just some of the advantages of MAS. We'd like to tell you more about the use of MAS in an interactive mode, including proprietary data base management systems. We'd like to show you the pay-offs—in reduced inventories, increased production through-put and better cash management—that have been achieved in practice by these distinctive systems. We'd like to prove to you the ease of implementation, sequence independence and systems integration that is part of MAS. Contact one of our regions for an MAS Overview Booklet or Specific Subsystem Definition. We'd like to hear from you.

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We Build & Run Systems

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Center Keeps Terminals Running

(Continued from Page 17)

the control center has a terminal on the Titan administrative network operated for the Teamsters Union.

The operators at the center can communicate directly with the main Titan facility when problems arise. The Titan net is operated under a facilities management arrangement by the Data Transmission Co. for the union, and the Sanders center provides the maintenance data for the CRTs in the network.

The maintenance data base is stored on a disk drive in the 8100 Sanders controller. In addition to the two 860 CRTs, the system includes a printer used to issue regular summary data of the maintenance operations.

Copies of these summaries are sent to the field offices as well as to Sanders' engineering department, Hendricks said.

As an adjunct to the control center, engineering maintains six 860 CRTs to do on-line diagnostics with malfunctioning terminals in the field. When serious problems occur, the field representatives at the customer site use dial-up lines to transmit diagnostic information back and forth to Nashua at 2,400 bit/sec.

The maintenance data base uses in-house IMP software and the system is housed within the 5M-byte disk subsystem on the 8100 controller.

The control center operates 12 hours per day although it is never fully shut down. When operators are not on duty, all In-Wats trouble calls are logged onto a recording device which is checked once each hour until the center reopens.

CW Photo by R. Frank

Terminal control center keeps repair data base.

FCC Gives Nod To WUI Service

NEW YORK – Western Union International, Inc. (WUI) has received approval from the Federal Communications Commission (FCC) to furnish International Digital Data Service (IDDS) to France, Italy, Spain and Austria.

IDDS is a digital service which will feature simultaneous transmission of data over both satellite and undersea cable circuits.

Citing "advantages" and "potential benefits," the FCC ruling called for a one-year experimental service. Before service can begin, WUI must file its tariff detailing rates and service terms.

A WUI spokesman estimated IDDS service could begin by mid-1976 after plans are finalized with telecommunications authorities in the initial four countries.

Entrex Package Allows Emulation

BURLINGTON, Mass. – Entrex, Inc. has released a communications software package option which allows all Entrex systems except the 280-1 to communicate with a wide range of binary synchronous communications devices, a company spokesman said.

With the Data/Comm parameterized communications option, the user may configure his system to emulate almost any device adhering to general binary synchronous line protocol, the spokesman added.

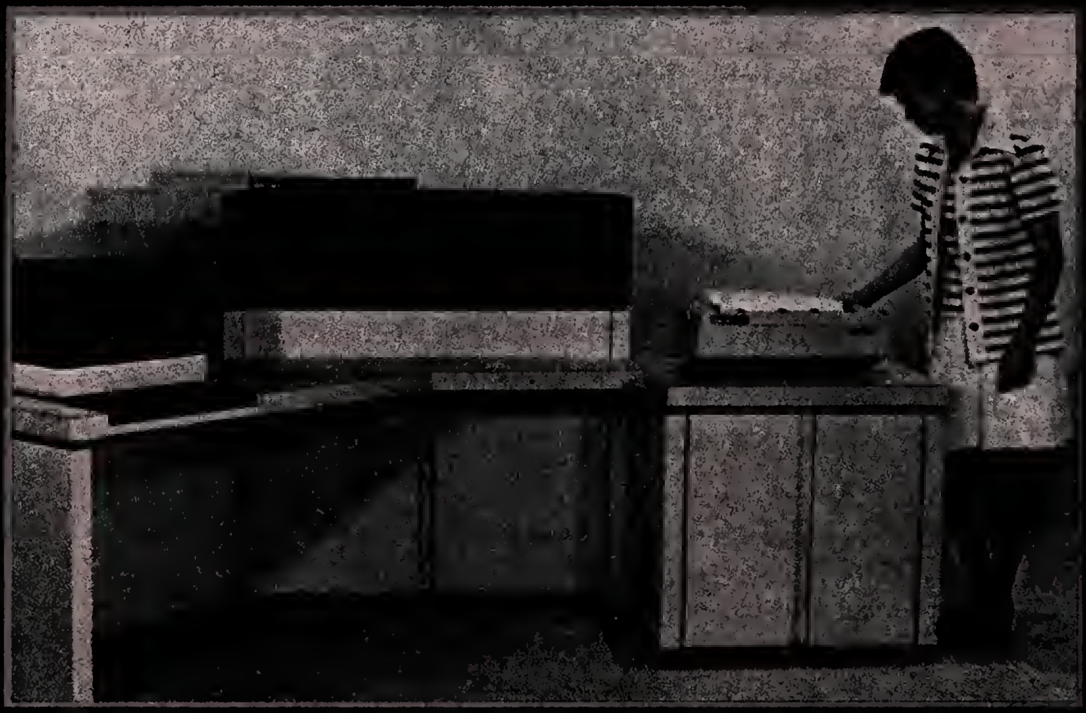
The option allows high-speed communications to be performed concurrently with data entry, preprocessing and formatted report generation at the source of data, he added.

Data/Comm's features include spooling, unattended operation, expanded buffer/record size, data transparency, data compression and multipoint support.

Using the package, the Entrex user may configure his system to emulate most binary synchronous devices, including IBM 3780, 2780, 2770, 3741, 3747 and 2698 models, the company said.

The Data/Comm package is available immediately from the company at 168 Middlesex Tnpk., 01803.

The
uncompromising MS88
from Tesdata.



Starts at $119,000
and worth every nickel of it.

NCR Expands 796 Series

DAYTON, Ohio – NCR Corp. has expanded its 796 series of display terminals with a CRT that features upper- and lower-case characters, multiple transmission speeds and the ability to insert or delete lines of information.

The NCR 796-401 Block/Conversational CRT terminal can be used as a direct replacement for a teletypewriter. It provides faster transmission speeds, local editing and the use of graphics, NCR said.

Through a selection switch, the terminal can operate at 110-, 300-, 1,200- and 9,600 bit/sec.

A total of 1,920 characters in 24 lines with 80 char./line can be displayed on the 12-in. screen.

Printers can be attached to the basic terminal.

The NCR 796-401, available immediately, can be purchased for $3,100 or leased for $130/mo.

Terminal Transactions

For Time-Critical Application

Bank Uses Batch Units in On-Line Net

BOSTON – While many organizations today are moving from batch processing to on-line computing, State Street Bank (SSB) here recently combined the advantages of each to produce a batch-entered, on-line terminal network.

The rationale for this system lies in the time-critical nature of the handling of millions of dollars in securities transactions which must be recorded daily by the Custodian Services Department, according to Jack Robinson, assistant vice-president.

The department has to ensure its mutual fund customers prompt daily reporting of current net asset value to the National Association of Securities Dealers for publication by the daily news media.

To handle the transaction volume, the bank installed Sycor, Inc. Model 340 and Model 350 batch terminals in an on-line network.

The Securities Pricing and Recordkeeping (Spark) system produces a variety of daily and monthly reports such as transaction journals and appraisals as well as a wide range of accounting reports including sales and purchase journals, investment ledgers, corporate action reports and dividend/interest receivable journals.

The bank's growth in the custodial area has been significant in recent years. As SSB's Custodian Services Department began to handle more clients, its transaction volume increased and the demand for on-line computing time grew as well.

"The increase in transaction volumes placed extremely heavy demands on the existing on-line terminal network as well as our keypunch facilities.

"We also found our on-line response time was beginning to show signs of degradation. The IBM Selectric typewriter terminals were not fast enough to handle the increased traffic.

"It was this increased volume which eventually led to the replacement of our on-line terminal network with intelligent terminals operating on-line," Robinson explained.

Other Problems

There were other problems too, A.E. Allison, SSB's senior vice-president, noted. "When you wanted to make a change in the on-line program it was usually a massive undertaking. We can now program these intelligent terminals to do many of the same editing functions at reduced time and cost."

Currently, 12,000 trade transaction/mo are entered on Sycor Model 340, Model 340 with dual diskette options and Model 350 intelligent terminals. The data, received by TWX, phone or mail from the individual funds or fund traders, is entered via the terminals and, at intervals, transmitted to the company's IBM 370/155 mainframe operating under OS/MVT for processing.

The terminals also are able to receive information from the 370 over the same phone lines used for transmission.

The terminals now perform a variety of edits and checks – ones that were previously done on-line by the CPU, including check-digit verification on account numbers, "must-fill" features, batch balancing of total shares and price per share and other arithmetic calculations.

The terminals' editing capabilities were a prime factor in their ultimate selection because SSB not only wanted to upgrade its daytime on-line network, but also saw the possibility of replacing its keypunch operation, which did night-time duty.

"While we weren't doing it specifically to save money, we were able to save with the wholesale replacement of both our on-line terminals and keypunching by one single device," Robinson said.

To some, $119,000 might sound like a lot of money for a system from Tesdata, the world's leading producer of computer measurement systems. But, Tesdata's MS88 is so much more than a measurement system, it's worth every nickel of it.*

In May 1975, Tesdata introduced its MS series consisting of four basic systems—MS38, MS58, MS68, and MS88. They are priced from $27,500 up. The acceptance of MS has been beyond expectations and, interestingly enough, the number one seller is the MS88. *Why?* Because it provides the large scale data processing system user with the greatest return on his investment; it has built in data reduction, data base, and full analysis capabilities; and, it is *uncompromising.*

Tesdata's MS88 is a new kind of management tool that enables today's data processing management to bring everything into focus. For a very small percentage of the total investment in computer resources, the large data processing operation can gain more effective control over the resources. It is a system designed to provide benefits to all facets of a data processing center: management, operations, programming, planning, performance analysis, and others.

The MS88 is uncompromising because it is the most advanced system available. Its hardware features: advanced collector technology; comparator; up/down counter; gas discharge plasma display; disk storage; and, a most capable mini-computer. It was designed with the user in mind by Tesdata development personnel in conjunction with the world's leading industrial designer, Raymond Loewy International, so it incorporates many ease-of-use features as well as beauty. Its standard software includes: MS88 System Software, including: *TDOS Executive Software; Measurement Recording Software; Test & Utility Software; Mini-Processor Analyzer, including Real Time Summary Reporting; Mini-Processor Management Reporting Software, with Graphic Reporting Capability; Working Set Monitor; Customer Development Software, Host Data Reduction Software, Host Management Reporting Software, and growing all the time.* It also comes with Tesdata's responsive service and support organization.

Customer acceptance is the ultimate test of value! There are any number of ways to evaluate a product's worth. But one measure stands out. Customer acceptance as expressed in add-on equipment and additional system sales to customers. Tesdata large system customers would not be acquiring their second, third, fourth or fifth system unless the benefits accruing from the Tesdata systems far exceeded the investments. A large business equipment manufacturer just installed an MS system, its third large Tesdata system; a major chemical company just installed two large MS systems and traded-in an older Tesdata system in use for two years; one of the country's largest life insurance companies is trading its older Tesdata system for an MS88; the same with a large midwest industrial concern; the computer services subsidiary of a major aerospace firm has installed five large Tesdata systems; and a number of Federal Government agencies have two or more Tesdata systems, to mention only a few of the cases.

To learn more about Tesdata MS, contact your Tesdata representative (we have offices worldwide!) or corporate headquarters: Tesdata Systems Corporation/7900 Westpark Drive/McLean, Va. 22101/(703) 790-5580/Telex: 89-9489.

*The MS88 may be leased for as low as $2675 per month. MS88 Model I is priced at $119,000 on a purchase basis, the Model II at $139,000 and the Model III at $166,000.

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Editing Recorder Micro-Driven

SUNNYVALE, Calif. – A microprocessor-driven editing recorder which handles data preparation, word processing and teleprocessing tasks has been announced by Anderson Jacobson, Inc. (AJ).

The AJ 730 combines a Philips-type cassette tape drive with control electronics in a desk-top console.

Using the AJ 730 in an off-line mode, an operator can record data or text, use search and edit line features to correct and update previously entered material and print as many copies of data or text as desired, the company said.

On-line, the recorder is equipped to operate as a store-and-forward device and as the central unit in an automatic data collection network.

Although primarily designed to interface with AJ's own terminals, it may also be used with other terminals or in networks of mixed terminals. The unit automatically provides the correct terminal protocol (for example, Ascii, Selectric or Teletype) and can differentiate among data transmission rates of 110-, 135-, 300- or 1,200 bit/sec, AJ said.

The AJ 730 leases for $85/mo with a purchase price of $2,850, the company said from 1065 Morse Ave.

CCI Upgrades CC-70 With CC-80 Features

TORRANCE, Calif. – Users of the CC-70 communications processor system from Computer Communications, Inc. (CCI) can upgrade their systems to attain the processing power and capabilities of CCI's CC-80 system, according to the vendor.

The CC-70P provides increased throughput and reliability by using MOS semiconductor memory and features of the CC-80 processor. It can be installed in the field with a minimum of system downtime, the firm said.

Software Compatible

The upgraded system is fully software-compatible with the CC-70 and is adaptable to CCI's computer communications software products.

A typical price for upgrading to a CC-70P is $35,000. First installations will be made in January, CCI said from 2610 Columbia St., 90503.

Teleprocessing's Simulator Replaces Pair of Modems

LOS ANGELES – Teleprocessing Products Co. has designed a modem simulator to replace a pair of synchronous or asynchronous modems in local, short-haul applications.

The Model TP-232 features selectable data rates up to 19.2 kbit/sec, digital loopback and the ability to regenerate an RS-232 interface beyond a 50-ft limit, according to the firm.

The unit may be used in either continuous carrier or polling systems or as a synchronous clock source for testing synchronous time-division multiplexer (TDM) channels.

Purchase price for the TP-232 is $500, the company said from Suite 101, 11110 Ohio Ave., 90025.

ISI Has 4165 Alternative For IBM 328X Printers

ANN ARBOR, Mich. – Interface Systems, Inc. (ISI) has introduced a higher speed, plug-compatible replacement for IBM 328X printer models 1 and 2.

The Model 4165 printer interfaces directly to IBM 3271 or 3272 control units and is therefore unaffected by software changes, according to ISI.

The 4165 uses a 9 by 7 dot matrix and delivers a 165 char./sec printing speed. Additional features include vertical format control, elongated boldface characters for highlighting and forms handling.

The printer also has automatic new line code recognition in unformatted mode, and head travel stops at the last printed character in formatted mode, ISI said.

Unit cost of the 4165 is $6,750; purchase and lease plans are available, ISI said from 5 Research Drive, 48103.

ICC Booklet Rates Modems

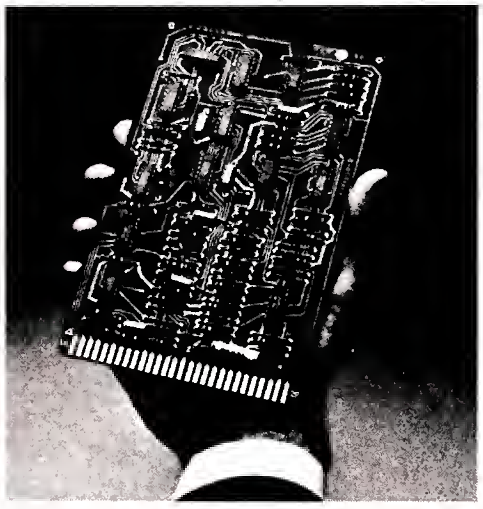
MIAMI – A booklet from International Communications Corp. (ICC) compares the firm's Model 24 LSI modem with the AT&T Dataphone 2400 data set.

The 16-page booklet includes a comparison of pricing policies, line turnaround time and features such as reverse and secondary channels and diagnostics.

Copies of the booklet are available at no charge from 8600 N.W. 41 St., 33166.

THE FEDERAL EXPRESS PARTSBANK. IT WILL CHANGE THE WAY YOU THINK ABOUT DISTRIBUTION FOREVER.

This little part can shut down an entire plant.



But so far, it's had to go through a complex series of separate operations and companies to get it where it's needed: regional warehouses, air freight forwarders, commercial airlines, and trucking firms. And nobody's been very happy with the results.

Now Federal Express has come up with a solution. And like all great ideas, this one is simple.

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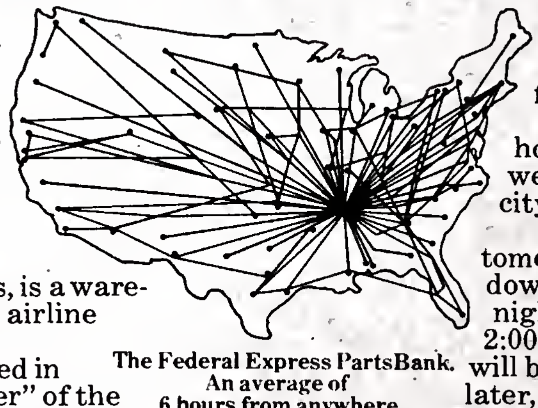
We call it The Federal Express PartsBank.

What it is, is a warehouse and an airline combined.



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It's located in the "air center" of the United States, Memphis.

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FEWER MOVING PARTS.

The advantages of The Federal Express PartsBank seem to put every other system of distribution at a disadvantage.

First, you don't need as much inventory.

With one central warehouse that can serve the entire country in a matter of hours, you don't need a lot of regional warehouses full of expensive inventory.

And that money can be used to work for you in other areas.

Aside from money, we can save you a lot of aggravation.

A broken machine is an unhappy customer.

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Say one of your customers' computers breaks down in Seattle at midnight. Just call us by 2:00 a.m. and the part will be in Seattle hours later, where either you can pick it up or we'll deliver it to you with one of our trucks.

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It's costing them the same or less than the way they were doing things before.

And instead of getting complaints for their service, they're starting to get some compliments.

We think The Federal Express PartsBank is the ultimate in fourth generation field support.

If you're interested, call Wylie Tate, Vice President, at 800-238-5345.

He'll arrange for you to talk to some of our customers to get their opinions.

Or he'll do a systems and cost analysis of the way you're distributing now versus the way we would do it.

And if you like, he can arrange for you to try us on a 4-week trial basis.

We know if we can change your thinking about distribution for 4 weeks, we can change it forever.

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NCR Hiking Century Rates

DAYTON, Ohio – NCR Corp. will raise maintenance and rental prices for most NCR Century series computers and associated peripherals on Jan. 1.

Monthly rental rates, which include equipment maintenance, will be raised by from .5% to 2.5% on most Century series computers. Rental rates remain the same, however, for the Century 151, 251 and 300.

Monthly rental rates for most Century peripherals will rise 1%. Excluded from the increase are the NCR 657 and 658 disk subsystems, the NCR 636 magnetic tape cassette reader, Century communications equipment and processor features.

For purchased computer systems, maintenance rate increases will range from 1% to 10%. The increases apply to all Century computers except the 151, 251 and 300.

Maintenance rate increases for purchased peripheral equipment will average 8.5%. However, the rates remain the same for the NCR 657 and 658, the 636, Century communications equipment and processor features.

Goes to Third-Party Leasing

Firm Gains Performance in Economy Move

By Patrick Ward
Of the CW Staff

GREENE, N.Y. – "We wanted to reduce costs, but do it without cutting horsepower. We were able to do that and then some by making a DP economy move," according to Bill Fairbanks, a systems programmer for the Raymond Corp.

Raymond Corp., a manufacturer of narrow-aisle electric lift trucks and semiautomated warehousing systems, faced a budget crunch last spring. At the same time, its DP department was running out of IBM 3330 disk capacity on its 128K IBM 370/125 running under Release 28 of DOS/VS. CPU saturation was also on the horizon.

So Raymond exchanged the rented 370/125 for a 256K 360/50 system from DPF, Inc., a third-party lessor. The package included Memorex 3330-equivalent disk drives and the Extended Disk Operating System (Edos) from the Computer Software Co.

"We are now paying about 10% less a month and we have literally doubled our CPU power, without any question," Fairbanks said.

The extra power has also saved Raymond about $1,000/mo in overtime charges it was incurring on the rented 125. The company has been able to drop weekend work as well.

While IBM 370s do offer such "bells and whistles" as superior error recovery, integrated adapters and VS, "370 price/performance is not competitive with what we have now," Fairbanks said.

Considered Options

Raymond had been using four 3330 spindles, the maximum IBM supports on a 125, when it ran out of disk capacity. The company considered going to a 135, but that would have been too expensive, Fairbanks said.

Another possibility was to keep the 125 but replace the four 3330s with eight 3340 data module drives. This option also called for two 3410 tape drives and the addition of another 128K.

But the 3340s would have presented a problem, since Raymond is a Data Base Organization and Maintenance Processor (Dbomp) oriented shop, Fairbanks said.

"Dbomp's structure will not let you develop any cylinder address beyond 511," he explained. "Since the 3340 has almost 700 cylinders, you're letting yourself out of using about 200 cylinder/pack as far as Dbomp is concerned."

Raymond could have replaced its Dbomp data base with IBM's Data Language/1 DOS/VS data base, but that would have been too big a move for the company's needs and budget, Fairbanks said.

The company then began looking at third-party lessors since "we had heard about their putting 3330s on a 50," Fairbanks said.

The choice narrowed to Itel Corp. and DPF, who were both willing "to take total responsibility for the hardware and software," he said.

Raymond chose DPF because it preferred that vendor's five-year straight lease proposal that was "full of outs" to the 36-month lease/purchase plan Itel offered.

Software Factor

Edos, part of the DPF package, also played a part in the choice. "It's got all the DOS enhancements that everyone likes," Fairbanks said.

Edos has "a 44K linkage editor that is at least four times as fast as IBM's," he said. The operating system also offers a relocatable loader, a resident transient feature, an "excellent" procedure library and a spooler, he said.

The conversion from Release 28 to Release 27 of Edos required recompilation but no recoding, Fairbanks said.

The transition was not without its hitches. The disk drives were slightly damaged in transit, but Raymond could not postpone installation, which was set for a two-week plant vacation in August.

Small disk problems took a couple of months to eliminate, but the equipment appears to be reliable now, Fiarbanks said.

Software was 90% reliable about three weeks after it was installed. Lately its reliability has climbed to about 95%, he said.

Proved Its Power

The 360/50 system soon proved its power to the Raymond DP staff.

A detailed materials requirements planning application using the Dbomp data base had run in 40 hours on the 125, but needed only 17 hours on the 50 during a benchmark comparison.

"We would have been happy if the job ran as slowly as on the 125, for the price we were paying for the 50," Fairbanks said.

Perhaps 25% of the runtime difference for the shop's Dbomp-oriented programs is because of the switch from DOS/VS to Edos, Fairbanks said.

"Dbomp is structured in overlays, which is inefficient for VS," he remarked.

Assemblies and ANS Cobol compilations run about twice as fast as before, as does any CPU-bound task, he added.

Other than the large Dbomp programs, the shop runs accounts payable and receivable and payroll jobs, Fairbanks noted.

Raymond's programmers have reacted favorably to the 370. "They like a stable operating system rather than continually having to go to new releases to get software support from IBM," Fairbanks said.

Along with the processor, operating system and disk drives, the third-party package includes two IBM 2501 tape drives, a 1403 N1 printer and a 2540 card reader.

The 360/50 system, including peripherals and maintenance, leases for about $10,000/mo. The 370/125 installation cost about $11,000 plus about $1,000/mo overtime rental, Fairbanks said.

Scan-Optics 501 Reads Journal Tapes

EAST HARTFORD, Conn. – The Scan-Optics System 501 is an optical scanner designed to read the journal tape or tally rolls prepared on adding and bookkeeping machines, cash registers and roll-paper impact printers.

While journal-tape reading capability has been available as an option within the cabinetry of Scan-Optics' 530 and 540 systems, the company is now offering the System 501 as a lower priced, separately packaged system.

Designed to accommodate a seated operator, the System 501 reads standard optical character recognition (OCR) fonts (NOF, 1428, 1403, 407, OCR-A and B alphanumeric) at up to 2,000 char./sec.

Line-reading speeds are determined by the number of characters read, tape width and data processing required prior to outputting to magnetic tape, Scan-Optics said.

The System 501 contains an 8K CPU expandable to 32K, a journal tape paper transport, 7- or 9-track 800 bit/in. magnetic tape drive, an I/O console printer and keyboard, on-line character insertion feature and 20 character positions.

Available Options

Options include a line printer, card reader, punched paper-tape reader and/or punch, 1,600 bit/sec magnetic tape and communications capability.

All Scan-Optics PRL software will operate with the System 501, which is compatible with other systems in the line which have journal-tape reading as an option. The 501 can be upgraded to a System 530 or 540 without loss of journal-tape reading capability, the firm said.

Prices range from $2,450- to $2,875/mo. on a one- to three-year lease. Maintenance is $750 within Scan-Optics service locations. The company is at 22 Prestige Park, 06108.

CEC Claims Up to 50% Cost Saving For NCR 200/201 Add-On Memory

RANCHO PALOS VERDES, Calif. – NCR 200 and 201 users can acquire add-on or replacement memories from Computer Enhancement Corp. (CEC) for 25% to 50% below NCR prices, CEC said.

The company's Ram-Stor 200/201 is built by Electronic Memories and Magnetics Corp. (EM&M), the original equipment manufacturer of Century Series core memory, CEC said.

The Ram-Stor systems can contain up to 16 32K-byte core memory modules for a maximum capacity of 512K, CEC said.

A single logic card adapts the Ram-Stor system to the NCR system, providing data control and buffering "that guarantee complete compatibility with the NCR computer," CEC said.

The Ram-Stor's modularity allows for easy changes in the memory's size and facilitates maintenance, the vendor added.

CEC is at 3937 Stalwart, 90274.

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With Broomall Controller

430 Plotter Put Under 360/370 Control

BROOMALL, Pa. – Broomall Industries' plotter control unit puts the firm's 930 series flatbed data plotters operating in either the burst or multiplex mode under the control of an IBM 360 or 370.

Designated the Model 430/560, the control unit operates either with or without an optional core buffer memory expansion.

The memory expansion, which consists of two 1,024-character core buffers, operates in an interleaved manner to allow the plotter to read from one buffer unit while the computer I/O channel writes into the other.

The core buffer expander permits operation on the selector channel or the multiplexer channel in the burst mode, a combination offering maximum efficiency and flexibility, Broomall said.

Without the buffer expander, the multiplex channel is used in the multiplex mode.

Signal sequences for a complete I/O operation include initial selection, data transfer and termination. Data transfer proceeds only upon readiness of the plotter to accept data.

If unready, the plotter transmits a busy signal back to the channel.

The 430/560 plotter control unit costs $7,500 from 682 Parkway, 19008.

Versatec Units Produce Plots On 72-In. Paper at 1 In./Sec.

SANTA CLARA, Calif. – Versatec's 4472 plotter and 4472A printer/plotter produce plots on 72-in. wide paper.

A shaft encoder determines timing and print location as the servo moves the paper, resulting in a vertical plotting accuracy of .3 mil, according to Versatec.

Paper speed is 1 in./sec at the full 72-in. width.

Input data rate is a maximum of 110K byte/sec. Standard electrographic or translucent paper can be viewed on a horizontal flat bed of over 12 sq ft or an optional extension table that allows viewing of over 36 sq ft, the firm said.

Available with a 256-character Ascii set, the unit prints 12.5 char./in. and 6.6 line/in.

The 4472 plotter is priced at $43,500 and the 4472A printer/plotter at $46,900 from the firm at 2805 Bowers Ave., 95051.

Fiche Reader Suited For Brightly Lit Sites

SCHAUMBERG, Ill. – The Model 950 microfiche reader from the Bruning Division of Addressograph Multigraph Corp. is especially suited to viewing computer output microfilm (COM) in a brightly lit office, according to the vendor.

The Model 950 offers front projection. The user looks through a blue filter onto its 11-in. by 11-in. screen.

The company also announced the Model 920, a rear-projection unit with an 11-in. by 11-in. screen that is also designed for microfiche viewing.

Each microfiche viewer costs $185 from the firm at 1834 Walden Office Sq., 60172.

Arber Disk Packs Reduced

TORRANCE, Calif. – The Athana Model 360044 disk packs from Arber Industries have been reduced in price.

The 360044s are IBM 3336 Model II equivalents.

The company now offers the packs for $600 to $650. Lease/purchase and rental plans are also available from the firm at 1815 Mullin Ave., 90501.

Mark-IV Line Controls DP Rooms

SANTA FE SPRINGS, Calif. – The Mark-VI line of computer room environmental control systems from Supreme Aire was designed to combine high performance with minimum energy consumption, according to the firm.

The series includes five different types of equipment, including air-cooled, water-cooled, glycol-cooled, chilled water and the water-cooled Energy Saver. Capacity ranges up to 50 tons.

The Energy Saver series uses rejected heat from the refrigeration cycle to provide a reheat capability. This can save some users about $2,000/year in electrical bills, the firm said.

Mark-VI energy efficiency ratios are in the range of 10 to over 11 for most models, among the highest in the industry, Supreme Aire said.

The Mark-VI series has a control monitor that continually monitors a broad range of room and equipment parameters. It also contributes to the total energy conservation of the system by controlling operation of only as many stages of cooling as are required, the vendor said.

Temperature is controlled to within ±2 degrees and relative humidity to within ±5%.

A 26-ton Energy Saver model costs about $650- to $750/ton installed, a spokesman said from 8110 Sorensen Ave., 90670.

K/Tronic Packaged Disks IBM-Compatible, Certified

SANTA CLARA, Calif. – The K/Disks from K/Tronic, Inc. come IBM-compatible, certified and initialized, the firm said.

Five diskettes are contained in a package along with file folders, stick-on labels for the file folder tabs and program identification cards.

The package design allows for convenient storage in standard file cabinets, eliminating the need to procure special storage equipment, the vendor added.

The separate identification card with each disk allows the user to log program material separately from the disk jacket, avoiding the danger of damaging the recording surface of the disk by writing on the jacket or by attaching and removing numerous stick-on labels, the firm said.

The package of five diskettes costs $37.50 from 3620 Scott Blvd., 95051.

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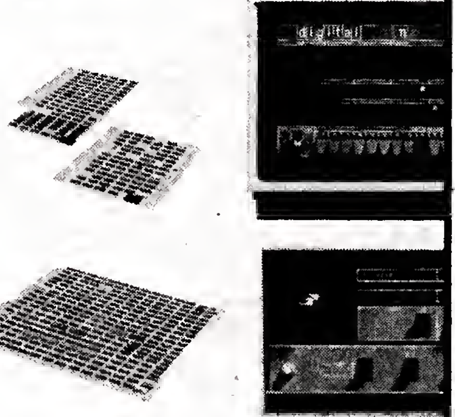

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☐ **TC-130 PE/NRZ Tape Controller for PDP-11** — Four boards provide both PE and NRZ formats on one controller for all PDP-11 series computers — controls up to eight magtape drives.

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Replaces Several Small Systems

Bureau Finds Net 'Holds Water' on Irrigation Projects

Special to Computerworld

DENVER – Like many other large organizations, the U.S. Bureau of Reclamation has replaced numerous small computers across the country with one central computer and a network of terminals.

The bureau's primary job is to develop the water resources of the 17 western states by constructing facilities that store and deliver water for municipal, irrigation and industrial use.

The bureau's Control Data Corp. Cyber 74, Model 28 both handles an administrative workload and serves as a tool for the bureau's engineers and researchers.

It helps them determine drainage requirements, predict the quantity and quality of return water flows from irrigated lands and track the weather, for example.

Until last year, the bureau had been performing these tasks on 24 separate, smaller computers, supplemented by more than $1 million spent annually on data services supplied by 14 vendors.

These 24 computers, scattered throughout the West, were unable to communicate freely with one another.

Now bureau field engineers can communicate with the central computer here through a readily accessible terminal and receive an answer in minutes.

Improved Efficiency

"The bureauwide network has improved operating efficiency by several hundred percent," according to D.W. Webber, chief of the division of data processing at the bureau's engineering and research center here.

"We have some of the top engineers in the country – and the computer network permits them to broadcast their specialized talents throughout the entire region," he said.

An Idaho study, using a computer estimate of water requirements, has shown how an irrigation management system can not only save precious water, but can increase crop yields by as much as 16%, while bringing the average 200-acre farm an additional $5,000 in income each year.

The computer estimates this water requirement by analyzing a test program which considers factors such as natural rainfall expectation, water-holding capacity of soil, effective root zone depth, percolation rate, daily climatic conditions, type of crop and the amount of soil moisture depletion.

This information is transmitted to the central computer by bureau field personnel, using a remote job entry terminal. Within 24 hours, the farmer receives a computer printout which gives him the optimum irrigation schedule over the next 14 days.

A computer program has been developed to optimize the design and placement of power transmission lines. Data fed into the computer produces a terrain profile of the area to be crossed, then determines the most economical mix of tower spacing vs. tower strength.

A tremendous amount of data must be accumulated before construction begins on a reclamation project. This data includes: site survey and selection, future benefits vs. project costs and types of materials to be used in construction.

Much of the technical and administrative data for solving scientific and engineering problems and for use as an aid in management practices of the bureau resides in a central file here where the information is stored in the computer's memory, on disk, tape and microfiche.

Called the Bureau of Reclamation Engineering Computer Systems (Brecs), this central repository makes available the software and documentation expertise within the bureau and facilitates communication between the various disciplines.

In the Bureau of Reclamation configuration, two central processors utilize a 128K 60-bit-word central memory, supplemented with a .5M-word extended core storage.

These memories are connected directly to 20 peripheral processors, each with its own 4K 12-bit-word memory, to handle the peripheral and input/output operations.

Four disk controllers and 20 disk drives provide 2.2 billion six-bit characters of on-line storage, backed by eight tape drives for off-line storage and processing.

Also at Denver are three 1,200 line/min printers, two card readers, a card punch, five communications controllers, 10 racks of telephone modules, eight multiplexers and six modems. This equipment is supplemented by 216 terminals.

At last, a system that makes credit verification as simple as it should be.

Ideally, credit card and check verification should be a simple "yes" or "no" proposition.

Unfortunately, at a lot of banks, supermarkets and other retail outlets, it's a complicated, time consuming process.

To solve the problem, Bell has designed the fast and simple to operate Transaction* telephone system.

The system includes the Transaction telephone terminal, the switched network, and 407 type data station interface. Plus, the data base computer.

The terminal itself is intended as the remote telephone in a digital inquiry-voice answer system. It has a single slot through which automatic dialing and bank or credit cards are passed. (If it's a check, the user keys in the account number.)

The Transaction telephone automatically enters customer and user information by reading the magnetically encoded ABA Track II stripe found on the back of most major bank and credit cards. It also fully buffers all of the data input.

Sequential instruction lights guide the user through the simple data input procedure. While the data is being entered, the telephone dials the number of the data base needed for verification. All of the buffered information is then sped through the switched network and the 407 type data station. Customer information is withdrawn, and an audio or visual response is relayed to the user.

In addition, the terminal can be used as a regular telephone. And it's available in Touch-Tone® or rotary.

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THE ART OF STRUCTURED THINKING

Yourdon announces four different courses dealing with different aspects of structured thinking.

Ed Yourdon, Bill Plauger, and Larry Constantine have all been in the vanguard of the "structured revolution." They, among others, will be teaching a number of "structured seminars" for Yourdon inc. in cities around the country over the next few months. To find out more about these courses, read on or send us the coupon on the lower right-hand side of the ad:

STRUCTURED DESIGN

This seminar is based on the definitive work done by Larry Constantine and Ed Yourdon. Course materials include the just completed 600 page manuscript *Structured Design* (Yourdon, 1975) by Yourdon and Constantine. The seminar concentrates on the design and structure of modules within a system, formalizing and quantifying the philosophy of "modular design." It introduces the concepts of coupling and cohesion, and discusses span of control, inversion of authority, pathological connections and transform-centered design as strategies for developing "good" designs for programs and systems. Course fee: $450. Dates and Locations: Jan. 28-30, Chicago; Feb. 9-11, Dallas; Mar. 24-26, Montreal; April 21-23, New York.

STRUCTURED DESIGN/ PROGRAMMING WORKSHOP

This 5-day seminar combines the major aspects of Yourdon's structured design and structured programming seminars, in a workshop environment. A major class exercise is used to illustrate the interactions between the "module design" strategies of structured design and the "GOTO-less" coding philosophies of structured programming. Course materials include *Structured Design* (Yourdon, 1975) by Yourdon and Constantine, and *Techniques of Program Structure and Design* (Prentice-Hall, 1975) by Yourdon. This seminar offers the participant an opportunity to test the theory in practical applications during workshop sessions. Course fee: $600. Dates and Locations: Jan. 12-16, Ottawa; Feb. 23-27, San Francisco; April 5-9, Washington, D.C.

STRUCTURED ANALYSIS

Structured analysis is a formal methodology for analyzing the user's requirements in a complex business environment, and a communication tool for precisely expressing well-structured thoughts in a manner that can be understood by users, management; and programmer/designers alike. One of the chief concepts of structured analysis is a top-down approach to the systems development life cycle, in contrast to the "classic" approach. Among the other important concepts are the use of data flow diagrams, hierarchical function charts and structured English as communication tools between user and analyst. Course fee: $300. Dates and Locations: Jan. 22-23, Los Angeles; Feb. 9-10, Montreal; March 18-19, Washington, D.C.; April 8-9, Chicago.

STRUCTURED PROGRAMMING

It is becoming more and more apparent that there is much more to structured programming than just removing the GOTO from one's code—there is "good" structured code and "bad" structured code. Structured programming is practiced differently in each programming language—there are very different guidelines for COBOL, PL/I, FORTRAN, APL and assembly language. Hence, Yourdon's structured programming course is given in each of the major languages.

STRUCTURED PROGRAMMING IN PL/I

Teaching the theory of structured programming is rather simple in this course, since PL/I contains almost all of the desired structures. However, recent studies have shown that the average PL/I programmer has had little practice actually using (and not abusing) nested IF-THEN-ELSE's, DO-WHILE's and block structures, so the course concentrates on practicing the use of these and other powerful PL/I facilities. Course fee: $450. Date and Location: Feb. 9-11, New York City.

STRUCTURED PROGRAMMING IN COBOL

It is well-known that COBOL provides some difficulties in structured programming, primarily because of its nested IF statements and its PERFORM-UNTIL. This seminar emphasizes practical techniques for writing good structured code in language that, to the structured programming purist, is at best mediocre. Course fee: $300 Date and Location: Mar. 8-9, New York City.

STRUCTURED PROGRAMMING IN FORTRAN

The language that Dijkstra called an "infantile disorder" has no IF-THEN-ELSE, no DO-WHILE, and no block structures. Nevertheless, this course teaches the programmer to write structured FORTRAN, with the assistance of the Rational Fortran (RATFOR) preprocessor—developed by Brian Kernighan at Bell Labs, and presented on magnetic tape to each student. Course fee: $300. Date and Location: Mar. 18-19, Washington, D.C.

STRUCTURED PROGRAMMING IN ASSEMBLER

The philosophies and techniques of structured programming are by no means restricted to high-level languages; this seminar uses IBM System/370 and PDP-11 assembler language to demonstrate the use of structured programming macros, "hand-compiling," and other techniques to write code that is both readable and efficient. Course fee: $300. Dates and Locations: Jan. 22-23, Los Angeles; April 26-27, New York City.

STRUCTURED PROGRAMMING IN APL

Precisely because of its cryptic, compact and complex nature, the issue of readability and maintainability is perhaps more important in APL than in the other languages. This seminar introduces the notion of an IF-THEN-ELSE function, a DO-WHILE function, and various other techniques to enable the programmer to write readable structured APL. Course fee: $300. Date and Location: Feb. 5-6, Boston.

For more information call Ms. Rikki Moss at Yourdon inc. 212 730-2670 or send this coupon to:

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Mini Bits

ACS Has Four-Bit Micro

PASADENA, Calif. – The ACS-4040MC series microcomputer from Automated Computer Systems is a modularized parallel four-bit general-purpose programmable computer.

It can be configured as an assembler/simulator system for software development with supporting operating system software or as a conventional microcomputer to be customized and programmed by the user for various applications.

The functional modules include a 4040 CPU printed circuit board (PCB); a 16-buffer output port PCB made up of a 2K-byte programmable read-only memory and a 1,280-word data read-only memory; eight-port tristate universal I/O PCB with handshaking capabilities; a plug-in switching regulated power supply module; and a full computer control/Hexadecimal display panel PCB.

The price is $2,115 from the firm at 2361 E. Foothill Blvd., 91107.

TMS 8080 Price Cut 75%

DALLAS – Texas Instruments (TI) has reduced the price of the TMS 8080 8-bit microprocessor by more than 75%. The purchase price of the TMS 8080 is now $34.25.

Continued high-volume experience on 4K random-access memories (RAM) was the major contributing factor in the reduction, TI said.

The TMS 8080 is supported by assemblers and simulators available through General Electric, National CSS and Tymshare time-sharing networks.

A full line of support peripherals including static RAMs, 4K RAMs, read-only memories and I/O devices are available, according to the company, which can be reached through P.O. Box 5012, 75222.

VRC Expands 4000 Capacity

SPRINGFIELD, Vt. – Vermont Research Corp. (VRC) has expanded the capacity of its VRC 4000 head-per-track memory and introduced an optional controller to interface the 4000 with Digital Equipment Corp.'s PDP-11.

The enhanced Model 4000 has 128 or 256 tracks, twice the number of data tracks originally available.

The standard bit rate is 4.25 mHz at 3,450 rev/min with 8.5 msec access time, one-third faster than the original Model 4000 access time, according to the company.

The VRC 4000 costs $4,650 in OEM quantities of 100 or over and the controller is priced at $4,500 in OEM quantities from the firm at Precision Park North, 05150.

Reconverts to System/3

Downtime Causes Firm to Replace B1728

By Esther Surden
Of the CW Staff

ST. LOUIS, Mo. – Excessive downtime on a newly installed Burroughs Corp. B1728 system caused Missouri League Service Corp., a credit union service bureau here, to convert back to the IBM System/3 Model 15 it had been using to process its 250,000 accounts a day.

According to William A. Rogers, manager of League Data Services, the company decided to install the Burroughs 1728 when additional capabilities to process an increased number of jobs were needed.

The firm runs jobs 24 hours a day in three shifts, 5-1/2 days a week and serves 130 credit unions in Missouri, southern Illinois and Arkansas.

The Burroughs system was installed last March, Rogers said.

The configuration included the B1728 processor, high-speed disks, two 715 line/min printers and additional head-per-track disk units and was to have cost $8,300/mo on a five-year lease.

Attractive Features

"The Burroughs machine had some features we can't get on the System/3," Rogers said. "High-speed tape drives and dual processing were features we considered attractive.

"On the System/3 we can run only two jobs at a time while, when the B1728 was running, we had seven or eight jobs going at once."

According to Rogers, the main problem with the system was Burroughs' lack of experience with it. The installation was the first in Missouri, and the service people just did not have the machine knowledge to get it running, he said.

"Also, they brought in gear that we felt was not fully tested," Rogers added. The Burroughs people were very cooperative, he continued, and brought in people from the outside to help.

Time and Aggravation

The company had an agreement with Burroughs that it would not pay until the system was operational, he continued. The total cost to Missouri League Services was about $1,500 in supplies, but more in time and aggravation, he said.

When the firm reconverted in September, changes were needed to cope with the increased job load.

The System/3 configuration included both a disk and tape system and cost the company $7,800/mo on a three-year lease plan, Rogers continued.

"We rewrote our main posting program from RPG-II into Cobol. By writing it in Cobol, we decreased the throughput by 65%, making the System/3 as fast as the Burroughs had been." The System/3 on Cobol is working out well, Rogers said.

The Burroughs system was too new, and everything we predicted could happen did happen, he continued.

Two of our four operators quit when we tried to install the new system, and the system went down and Burroughs couldn't fix it, he said.

Lowest Cost Time-Sharing System From DEC Based on PDP-11/V03

MAYNARD, Mass. – A four-user system based on Digital Equipment Corp.'s PDP-11/V03 microcomputer and aimed at educational users is said to be the firm's lowest cost time-sharing offering.

Called the MU/11V03, the basic system includes 28K words of memory, a dual floppy disk memory storage unit and a choice of either the 24-line VT-52 video display or the LA 36 Decwriter terminal and will cost $16,220.

The firm said three more terminals can be selected at additional cost from the following: a 12- or 24-line CRT, a 30 char./sec hard-copy terminal, graphics terminal and one with hard-copy capabilities.

Primary Applications

Primary applications will include computer literacy and usage studies; problem-solving and computation for mathematics, engineering and science; simulation of physical and social phenomena; and computer-aided instruction in mathematics and languages.

Users can write and execute programs in Basic, Fortran IV(optional for $700) or Macro Assembly language under DEC's RT-11 real-time operating system.

One Fortran IV or Macro program may be executed simultaneously with up to three Basic programs.

The system exemplifies PDP-11 family compatibility in that Basic or Fortran IV programs developed on the MU/11V03 will run on all other PDP-11 models, according to DEC.

Highlights of MU-Basic on MU/11V03 include string calculations, program chaining and virtual arrays.

Prices range from $16,220 for a single terminal version to $19,970 for the maximum four-terminal configuration. Initial deliveries are scheduled for January.

Decwriter II Gets Quietizer

CITY OF INDUSTRY, Calif. – Van San Corp. has a Quietizer enclosure for Digital Equipment Corp.'s Decwriter II.

The Quietizer Model 8527 costs $279.50 and is available within 45 days from the firm at 1180 Center Drive, 91748.

Device Manages Energy Loads

PLAINFIELD, N.J. – An energy management system based on the Lockheed Electronics Co., Inc. LEC 16 minicomputer has been introduced by Lockheed here.

Called the Lockheed 7600 energy management system, the unit automatically monitors and controls lights, heating, air conditioning, fans, motors, pumps and other electrical and gas loads.

One system can manage up to 31 buildings through "remote monitoring devices located in each building that work on demand of the host system," a company spokesman said.

Built-in 16 load-management programs enable real estate managers to tailor the system to building needs, he continued.

Other system features include self-check; automatic restart without loss of instructions; random load shedding; operation without computer knowledge; and daily, hourly or shorter period print-out of savings consumption.

Basic model price is under $40,000, not including installation. The system is available from the firm at U.S. Highway 22, 07061.

Calcomp Adds OEM Floppy

ANAHEIM, Calif. – California Computer Products, Inc. (Calcomp) has announced the Calcomp 142 double-density floppy disk drive for OEM customers requiring up to 802K bytes of storage per diskette.

The Calcomp 142 incorporates a modified frequency modulation self-clocking recording code.

The 142 records up to 802K bytes of unformatted data per diskette. Transfer rate is 500,000 bit/sec and access time is 6 msec track-to-track.

The Calcomp 142 is priced at $650 in single quantities. Production units will be available for delivery this month, the firm said from 2411 W. LaPalma Ave., 92801.

Primesharing:

A virtual memory Prime 300 is like having up to 31 separate computers in one box. Each user has access to a complete virtual computer system that includes a processor with microprogrammed floating point arithmetic; high-speed disk file storage; 128k bytes of 600 nanosecond access MOS main memory; FORTRAN, BASIC and Assembler languages. Users can simultaneously develop real-time application software, handle data base management, execute complex computational programs, develop microprograms for the system's writable control store...and more. Write or call Prime for full details.

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System Ensures Equipment Supplier Has Parts on Hand

DENVER – A minicomputer purchased for on-line inventory control helps a gas and oil industry equipment supplier here replace its customers' parts quickly.

A customer waiting for a part can lose up to $10,000 a day in production costs, Pamco said, so inventory control is essential.

"We had no real control before," Secretary-Treasurer L. Glen Finley said.

"The result, with 26,000 parts in stock, was that we were undoubtedly carrying many more items than necessary just to make sure we could respond to any demand."

Pamco is a distributor for more than 100 makers of industrial power equipment, with the principal one being the Waukesha Engine Division of Dresser Industries, Inc., a large maker of natural gas-fueled engines.

Pamco is also a fabricator of electric plants, gas compressors and pumps. In a normal month, Pamco's office staff here processes 2,200 invoices which average six line items each.

This volume, along with the other paperwork, provided a second impetus for the entry into DP.

For a time, an accounting machine with a small drum memory and punched paper tape files had been adequate, but it was too slow and too limited to keep pace with the company's growth.

"If we had been concerned solely with accounting functions, any number of batch-processing computers would have been suitable," Finley said.

"But because of the need for timely inventory control, an on-line system was the only feasible answer."

Pamco considered IBM, Quantel and Lockheed systems before going with an NCR Century 8200, Finley said. IBM was rejected because of price, and Quantel and Lockheed were unable to provide the necessary support, the company felt.

NCR had the best system and seemed to be in the business to stay, Finley added.

The configuration selected has a 32K central processor, a 300 line/min printer, a 300 card/min reader and four magnetic disk spindles, two of them stationary and two removable. Each of the disk packs puts 5M characters of information on-line. A CRT terminal serves as the operating console.

Input data is keypunched, but it is anticipated that it will later be done on the console CRT and another such unit. A third CRT will be located in the parts department for inventory depletion.

"The computer system we have now will handle double the present volume of business," Finley said.

"Beyond that, we can double our disk pack capability, add more CRT units and increase the number of line printers."

This explains, in part, he continued, why Pamco decided to purchase the 8200 system.

The price was $75,000, plus sales tax and a maintenance contract, as opposed to an annual lease outlay of $28,000. Finley estimated the company's investment will pay out in a maximum of four to five years.

Accounting Operations First

Although inventory control is critical, accounting operations received first attention. Within two months after the May installation, accounts receivable and payable, the general ledger, the 150-person biweekly payroll and financial statements had all been converted using programs provided by NCR.

Showing management "instant" results was important, according to Finley. "All too often, it can take six months and more before a computer center is able to produce."

Pamco derived immediate benefits from its computer installation, according to Finley. The old machine could only do a balance-forward operation, applying payments to the lump sums owed.

Now payments are applied to open items. This is informative for the company and helpful for its customers because, to keep their own records straight, customers need to know the details of items for which they have paid and items for which they still owe.

Among the reports produced by the computer are a twice-a-month listing of delinquent accounts receivable, a comparison of budgeted and actual costs, purchases by vendors and sales breakdowns by branches.

Floppy Controller Available From Icom

CANOGA PARK, Calif. – A floppy disk controller designed for use by OEMs in industrial, commercial and development applications is available from Icom, Inc. here.

The Model CF360 can accommodate from one to four floppy disk drives and includes a general-purpose interface compatible with most microprocessors and minicomputers, the firm said.

The controller is fully IBM 3740 and 3540 compatible with all formatting and deformatting accomplished automatically within the controller. The controller also performs track seek/verify and cyclic redundancy check generation and verification automatically.

Independent 128-byte (full-sector) input and output buffers offer the possibility for direct memory access or programmed I/O operation. The ability to write/protect individual drives also is provided by the controller.

The CF360 single unit price is $850 from the firm at 6741 Variel Ave., 91303.

Datum Releases Disk System

ANAHEIM, Calif. – A ten-platter, moving-head disk system for Data General Corp. Nova and Eclipse, Digital Computer Controls, Inc. D-116 and Keronix, Inc. IDS-16 minicomputers has been introduced by Datum, Inc.

Designated the 4091-N, the disk drive and controller sells for $9,995 in unit quantities, significantly below the $15,000 to $16,000 price of comparable units, the firm said.

The unit has a storage capacity of 30 bytes by 10^6 bytes with a recording density of 2,200 bit/in. Average random access time is 55 msec, data is recorded on 20 surfaces at 100 track/in., with 203 track/surface. Data transfer rate is 312 kbytes/sec.

The system costs $9,995 and is available from the firm at 1363 S. State College Blvd., 92806.

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A powerful INCOTERM SPD® 10/20 Intelligent Display terminal serves as controller for 50-odd mobile teleprinters in local and county police cars covering nearly 500 square miles of northern Illinois.

The officers on the road call in verbal reports and queries; they get hard-copy responses right in the cruisers. For the first time, police can receive such transmissions with no risk of unauthorized interception.

At the other end, INCOTERM ties into the Illinois LEADS system in Springfield, to access the state's fast-growing criminal data bank...about crimes, about vehicles, about stolen property, about guns.

Through INCOTERM, the officer on the street can also communicate with law enforcement agencies in surrounding states—Wisconsin, Ohio, Indiana, Kentucky—over the high-speed lines of the new ALECS system. And INCOTERM also ties him into the NCIC system of the FBI.

Even if a suspect is seated in the cruiser beside the officer when the return message comes in, INCOTERM screens the information in the station house first to permit the encoding of data critical to the officer's safety.

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For County Coroner's Office

System Helps Piece Together Pathological Puzzles

LOS ANGELES – A minicomputer-based analysis system is solving pathological mysteries which previously would have been filed away as "unknown" by the county coroner here.

Using a recently installed minicomputer-controlled gas chromotograph/mass spectrometer, the coroner's toxicological laboratory has been able to determine the exact cause of death in many cases where conventional equipment would not have been able to do the job.

Edward Thompson, senior toxicologist at the coroner's office, cited as an example the case last summer of the badly decomposed body of a woman which was found floating in the waters off the coastline.

When conventional testing methods failed to identify the reason for the woman's death, the gas chromatograph/mass spectrometer manufactured by Finnigan Corp. in Sunnyvale, Calif., determined the woman hadn't drowned, but had been poisoned and them dumped into the ocean. The results set off a police investigation.

"Had the case come to us several months earlier, we might have not been able to determine the exact cause of death, because it is almost impossible to analyze badly decomposed products using conventional equipment," Thompson said.

Chief advantage of the Finnegan equipment is its ability to tell the toxicologist exactly what a specific compound is, Thompson said. "Now, we can quickly and precisely analyze a wider range of organic compounds than is possible using conventional equipment."

Nearly 16,500 cases pass through the coroner's office each year, and approximately 6,000 of these fall into the hands of the toxicology lab.

The heart of the system is a Computer Automation, Inc. Naked Mini system which gathers, records, analyzes and displays the data it receives.

The system works this way: a toxicologist enters the extracted specimen into the units. Then, a gas chromatograph separates the complex chemical mixtures into constituents for analysis.

The constituents then are electronically scanned and converted into digital representations that are stored in the minicomputer's memory. This digital representation, when called out via the keyboard, is converted into information that is displayed as mass spectra – a series of peaks along a line – on a CRT.

The computer's memory stores the names and mass spectra numbers of hundreds of drugs and other substances.

Through a keyboard, the toxicologist can search the memory to identify the compound most like a given mass spectrum. The computer provides a printout of all compounds resembling the unknown and indicates the degree of match.

Without the computer, the same analysis would require manually comparing raw data from a mass spectrometer and then comparing the mass spectra of one compound against a library, a process that would take days, he explained.

"We still use all our conventional laboratory techniques for the thousands of routine analyses which are performed each year," he said. "But when we have problems in identifying a compound – maybe we're just not sure; maybe we have no idea what it is – that's when we find the system an invaluable tool."

Hospital Pins Down Food, Lab Charges With Aid of Mini

PHILADELPHIA – A minicomputer at Hahnemann Hospital here has saved the institution an estimated $1.5 million by pinning down laboratory charges and curtailing unnecessary food preparation.

Hospital admissions procedures have also been reduced to under 30 minutes.

Under the previous manual system, 30% of $5 million in laboratory work was not picked up, according to Marin Reich, vice-president of RMC, Inc., the company that manages the computer facilities for Hahnemann.

Mumps Packages

The system consists of two Mumps-11 software packages operating simultaneously on a Digital Equipment Corp. PDP-11/45 with 48K of core and 16K MOS memory. The system is able to process over 40M characters of information.

Mumps is a data base management system that works with both numerical and textual data.

Admission-Discharge-Transfer (ADT), the first software package developed for Hahnemann by RMC and Advanced Medical Systems, Inc., follows a patient from admission through discharge. The second package, called Multilab, maintains a daily in- and out-patient file on all lab work.

When a patient arrives at Hahnemann, he is assigned an identification number and the admission clerk requests ADT for a display of available beds by floor, room or nurse's station. The patient is assigned a location suited to his requirements.

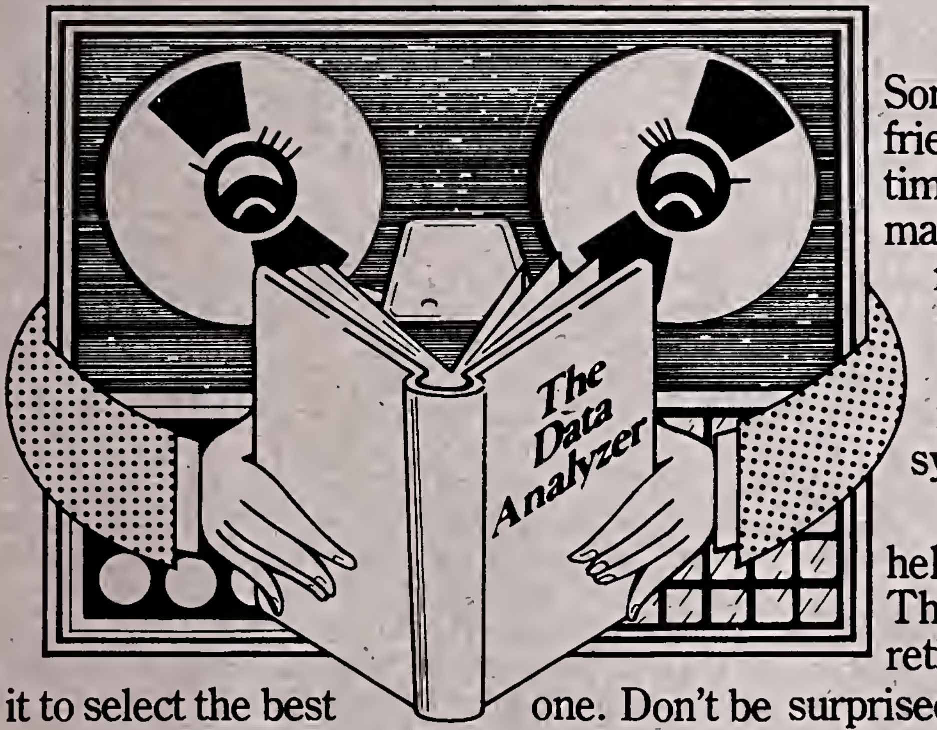
If the patient's status or location are changed during the hospital stay, the file is updated and the information appears on a list printed out every day.

In one year, knowing how many meals to prepare and where to send them saved the diet kitchen $36,000 in food costs.

With the Multilab package, 14 remote terminals connected to the PDP-11/45 are situated in the laboratory. The program maintains a daily file for all in- and out-patient tests and gives work-in-progress reports on the status of all tests performed in the lab, including a physicians report of the results of tests on all his or her patients that day.

The computer assigns a number to each test and generates a list for morning blood collections, according to priority and location of the patient.

Maybe your computer could help find a way to get management off your back.



It's not that they are ogres. Some even may be your closest friends. But when they ask for one-time reports, management summaries, EEO and other government reports, they expect them in a few days. And close friends or not, they'll be on your back. Which means a good retrieval/reporting system is needed. But which one?

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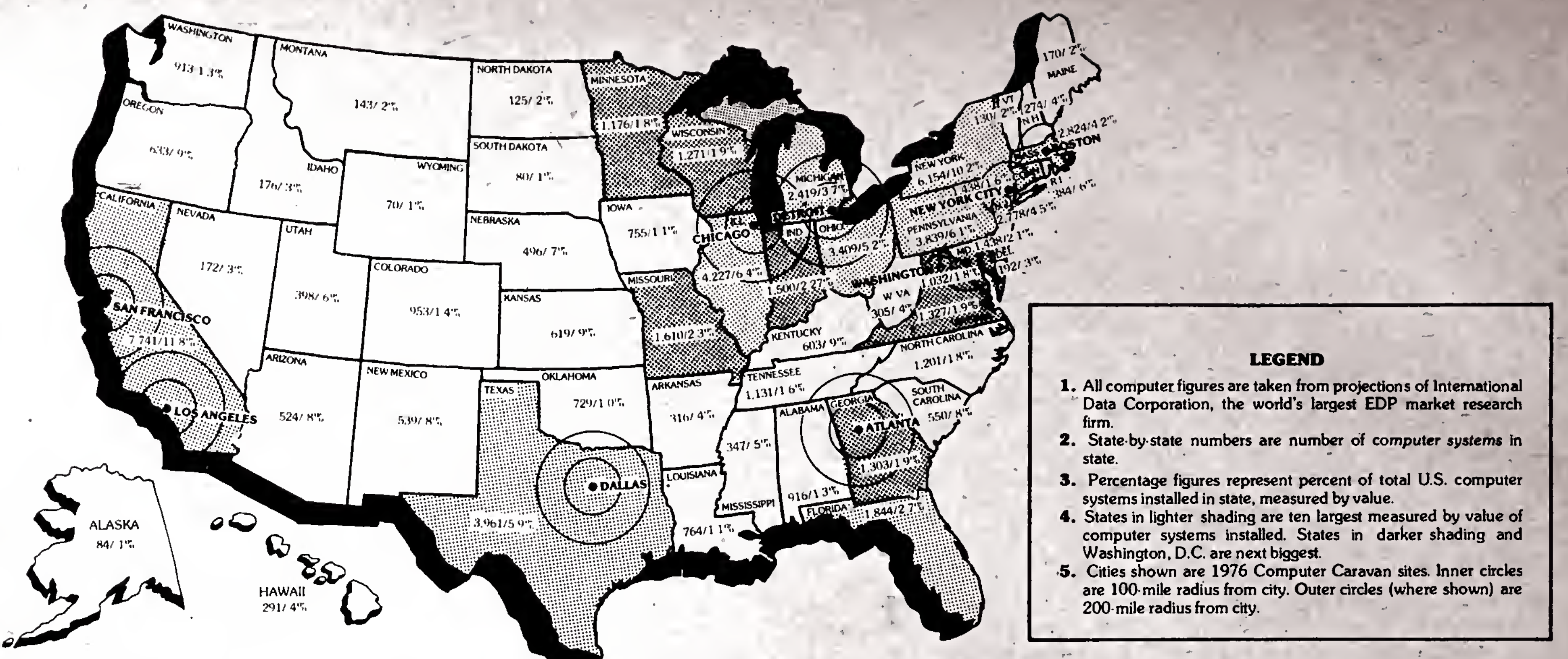

LEGEND

1. All computer figures are taken from projections of International Data Corporation, the world's largest EDP market research firm.
2. State-by-state numbers are number of *computer systems* in state.
3. Percentage figures represent percent of total U.S. computer systems installed in state, measured by value.
4. States in lighter shading are ten largest measured by value of computer systems installed. States in darker shading and Washington, D.C. are next biggest.
5. Cities shown are 1976 Computer Caravan sites. Inner circles are 100-mile radius from city. Outer circles (where shown) are 200-mile radius from city.

Going your way is our way.

Computer Caravan/76 brings a national computer conference to key computer-using states across the country.

Measured by value of computer systms installed, the ten largest states in the U.S. (lighter shading on map) account for more than 60% of all computer systems in the United States. Adding the next biggest areas - 7 states and the District of Columbia (darker shading on map) - we get to more than 75% of all the U.S. Computer systems, measured by value. And it's these key states in the computer world which will be host to - or nearby - one or more of the nine cities in the Computer Caravan / 76 - the travelling computer users' forum and exhibition sponsored by *Computerworld*.

To computer professionals, this means a unique opportunity to see a national computer show without leaving the office for a week and travelling across the country. It's a chance to keep up on the latest information in our user-to-user forums and on the latest products and services in our complete exhibition.

And thousands of computer professionals will take advantage of this opportunity as the Caravan moves across the country. The '76 Caravan can expect attendance of over 30,000 computer professionals, and unlike any other computer show, significant numbers of attendees will come from each of 15 states and the District of Columbia -- representing 65% of all U.S. computer systems installed. That's true national coverage.

As a marketer of computer products and services, the Computer Caravan offers you a unique opportunity to meet the professionals who run our country's computer installations in a one-to-one, business oriented atmosphere. Because there are 27 different show days, no one Caravan day is too crowded to give you the opportunity to present your products or services in detail -either on our exhibit floor, or in your own product seminar. And the 1976 Caravan offers several innovations which can make it more suitable to your individual marketing problems:

1. For companies with limited marketing areas, there are 3 regional tours (East, Midwest or West) to choose from - or our new "Major City Tour" (New York, Chicago and Los Angeles). You'll be covering only part of the total market, but that may be all you want - and costs are much less.
2. For companies specializing in the OEM market, there is our new companion show, COMPDESIGN 76. Sponsored by *Computer Design* magazine, this show will appear in the same halls with the Computer Caravan in five key OEM markets: Boston, New York, Chicago, San Francisco, and Los Angeles. It will attract thousands of key computer designers, and will also be open to Caravan attendees in those cities.
3. Data communications marketers can take advantage of our DATACOMM 76 add-on, which gives you a spot in the national data communications show sponsored by *The Data Communications User* magazine.

There's a lot more we'd like to tell you about Computer Caravan / 76, but if you're interested in exhibiting, time is short. So send in the coupon right away.

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CI Notes

House Gets Unchanged 'Disc'

WASHINGTON, D.C. – The Tax Reform Bill has been voted out of the House Ways and Means Committee with the Domestic International Sales Corp. (Disc) provision unchanged [CW, Oct. 15].

As the tax bill is now written, firms with a Disc can defer taxes on a maximum of 25% of their average annual export earnings.

Firms with export profits under $100,000 would still be permitted to defer 50% of taxes due on total Disc incomes.

The measure will probably be approved on the House Floor, but faces an uphill battle in the Senate, sources said.

Incoterm to Make Automatic Teller

NATICK, Mass. – Incoterm Corp. plans to enter the automatic teller business through a license from Transac, a subsidiary of CGE in France.

The agreement gives Incoterm manufacturing and distributing rights for an automatic teller machine in the U.S., Canada and Mexico.

Incoterm similarly licenses Transac to make and distribute its intelligent display terminals in common-market countries. Transac uses Incoterm minicomputer designs in its automatic teller machine, Model T-24.

Incoterm said it looks upon the T-24 as a logical extension to its Series 7000 on-line banking system.

Tymshare to Buy Autex

CUPERTINO, Calif. – Tymshare, Inc. has agreed in principle to acquire the business and operations of Autex, Inc. in an exchange of stock.

The agreement is subject to completion of a definitive agreement and approval by the Autex shareholders.

Supershorts

Arber Industries International has signed YB Computer Services as distributor in the UK for its Athana magnetic media.

– – –

Microdata Corp. has named CMC Germany as German distributor of Microdata's Reality system.

– – –

Okidata Corp. has selected Data Dynamics Group Ltd. and its subsidiaries to distribute Okidata peripherals throughout Europe. Data Dynamics has ordered CP110 printers valued at over $1 million.

– – –

Diablo Systems, Inc. has delivered its 25,000th Series 30 disk drive.

With Most Units Installed

DEC Ranked First in '75 Federal Census

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. – Digital Equipment Corp. pushed Univac to second place to become the top-ranking vendor this year in terms of the number of computers installed in Federal government agencies.

IBM came in third, but retained its number one place for value of equipment installed, according to the "Inventory of Automatic Data Processing Equipment in the U.S. Government" for fiscal 1975 issued by the General Services Administration.

The report listed DEC with 1,699 installed machines and Univac with 1,368. IBM was a close third with 1,320.

Honeywell placed fourth with 706 units and was followed by Control Data Corp. (CDC) with 541; Data General Corp., 372; and Hewlett-Packard Co. (HP), 361.

Xerox was close behind with 360 machines while Burroughs Corp. accounted for 315 and Varian for 193.

Manufacturers classified as "other" had the second largest installed base, with 1,414 machines.

The number of computers installed within the government as of June 30 totaled 8,649 with a value of $1.4 billion, according to the report.

IBM Leads in Value

In terms of value of installed CPUs, IBM was out ahead with $441.6 million, followed by CDC with $329.1 million, Univac with $187.7 million and Honeywell with $118.2 million.

DEC was fifth with $54.8 million, followed by Xerox with $46.3 million, Burroughs with $41.3 million, HP with $11.3 million and Data General with $9.1 million.

Including the value of peripherals such as storage units, I/O units and communications terminals, the ranking stayed the same in the first four places. Burroughs became fifth, Xerox sixth, DEC sunk to seventh and HP was eighth.

The value of IBM equipment installed in the government totaled $1.5 billion as of June 30, the report indicated, whereas that of DEC was $99 million.

IBM Share Shrinking

IBM's share of the installed government base in terms of numbers of machines has been steadily shrinking. IBM held 54.8% in 1960, 42.3% in 1965, 26.4% in 1970 and 15.3% in 1975, according to the report.

Burroughs, CDC, Univac and Xerox all held a smaller portion of the installed base by number of units than they did in 1970.

Burroughs went from 3.9% in 1970 to 3.6% in 1975; CDC, 7.7% to 6.3%; Univac, 22.7% to 15.8%; and Xerox, 4.3% to 4.2%.

DEC's share soared from 9.5% in 1970 to 19.6% in 1975. Honeywell's portion grew from 5.6% to 8.2%, according to the figures.

Acquisitions Down

Undoubtedly no secret to vendors is that government acquisitions of DP equipment, including peripherals, during 1975 took a sharp drop downward from 1974 – from $725.4 million to $493.8 million.

The value of CPUs acquired during 1975 dropped to $146.9 million from $225.3 million last year, but the number of CPUs, indicating increased minicomputer acquisitions, dropped only to 851 from 1,240.

Storage units acquired in 1975 declined in value from $293.1 million in 1974 to $195.5 million while communications terminals dropped from $56.2 million to $34.7 million.

By far the biggest user was the Department of Defense with 4,245 machines, of which the Air Force had 1,651.

The Energy R&D Administration came in second with 1,904 machines and the National Aeronautics and Space Administration ranked third with 1,114 machines.

DEC's number one rating was helped considerably by its 1,013 machines installed within the Energy R&D Administration, which also had the largest concentration of Data General machines (101 units).

Univac, IBM, Honeywell, CDC and Burroughs had their largest concentrations in the Department of Defense.

(Continued on Page 35)

Adapso President Calls Expertise Service Firms' Greatest Asset

NEW YORK – Services firms should be placing more emphasis on marketing their most important asset – which is not computers but expertise, according to Leon Weisburgh, newly elected president of the Association of Data Processing Service Organizations (Adapso).

"I think we have been misleading ourselves on what the reason for our existence is," Weisburgh said. The reason is generally thought to be to share computer power, but "it's really not computers, it's our expertise in transcending all the areas of the use of the computer – the operations, the programming, the systems, the control.

"The emphasis should be on the people part of the computer and not on the computer part," he said.

Weisburgh said his thesis applies to almost all types of services firms except those that sell raw time. This sector, he added, has traditionally been the most unprofitable.

Those companies that are profitable are basically selling packages and their ability to put together and use the packages, he said.

"Clients care that the services firms have people who can relate to their needs. They don't care about the computers the firms use," he said.

Many clients have indicated they have in-house DP managers who didn't know the firm's business, but simply knew how to run the hardware.

"We are relating to management needs. The customer couldn't care less how we solve them, as long as he has reports that let him run his business," Weisburgh said.

Growing Specialization

"We're getting more and more specialization in our industry by both application and by type of business," he said. "This has been very dramatic over the past 10 years, and I expect it to become even more fragmented" with hardgoods manufacturing as opposed to softgoods manufacturing, or medical groups as opposed to hospitals.

"This industry expertise reinforces the argument that the DP services industry offers American business computer skills along with a highly trained base of personnel who know how to solve specific business problems.

"Is it necessary for the typical computer user to constantly reinvent the wheel, when so many of the answers and solutions are being applied daily by DP services companies?" he said.

"Not only does the DP services industry provide specific expertise, it generally accomplishes tasks within a shorter timeframe and at a lower cost.

"How often have we heard of a computer department missing a target date because key individuals were bogged down in some daily routines? Or computer programs that needed repeated revisions as a new application became operational? Or the steady increase in equipment costs to provide more capacity during peak periods? he asked.

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Tests by CDC Show

E. German CPU Outperforms 370/145

The ES-1040 model in the Ryad series and East European peripheral devices were shipped to the U.S. for evaluation purposes by Control Data Corp.

WASHINGTON, D.C. – The East German-built ES-1040 computer is twice as powerful as IBM's 370/145 in internal computing power, according to tests run by Control Data Corp.

The 1040 is a member of the Ryad series of machines, designed to be compatible with each other, built by various Eastern Bloc countries. The unit's operating software is fully compatible with that used on IBM 360s, according to Robert A. Koenig, who detailed the test results at a recent press briefing at which CDC displayed but did not demonstrate the 1040 [CW, Dec. 3].

Running the Gibson mix of programs, a standard test that measures the internal power of a system, the 1040 was found to be twice as powerful as the IBM 370/145. Test score for the 1040 was 2.40 compared with 1.23 for the CDC Cyber 73, 1.77 for the IBM 370/155, 4.95 for the 370/145 and 6.50 for the 360/50.

Results of a second test to determine the system's arithmetic capability showed the 1040 can add, multiply and divide three to four times faster than the 370/145.

Koenig said CDC is still testing the speed of the processor memory in business DP applications, but thus far company officials believe the 1040 will prove to be at least equal to the 370/145.

CDC also tested the 1040's ability to run problems written for the 360, Koenig said. The most crucial test involved running a set of jobs from CDC's Service Bureau Co. (SBC).

This test showed the 1040's instruction set compatability allows all software and applications programs written for the IBM 360 to run on the 1040 and other compatible members of the Ryad family, Koenig said.

As for technology, the 1040's CPU is constructed from integrated circuits that belong to the transistor-to-transistor logic (TTL) family. Made in East Germany, the circuits appear identical to those manufactured by such U.S. companies as Texas Instruments, Motorola and Fairchild, Koenig said.

"A Ryad 1040-class machine could have been built in the U.S. in 1968 or 1969 using domestic sources," he said. "However, its appearance as a prototype in late 1972 indicates a three- or four-year technology lag in integrated circuits."

Several advanced design techniques are responsible for making the machine as fast as it is, including microprogram control of the processor and its input/output channels and an instruction look-ahead feature which allows the processor to overlap the functions necessary to execute an instruction, Koenig explained.

The core memory is somewhat slow compared with the speed of the processor, with the result that performance could be enhanced with a faster memory, he said.

Describing the technology as 10 years old by current U.S. standards, Koenig noted this shortcoming is partially masked by a wide path to memory and a look-ahead feature that allows the processor to overlap the functions necessary to execute an instruction.

The 1040 has a memory capacity of up to 1,024K bytes of core, with a typical unit made up of from two to four modules, allowing memory interleaving for greater throughput, he said.

Memory accesses are made in terms of double words – 64 bits – with 450 nsec access time and a 1,350 nsec cycle time. The theoretical memory transfer rate of 142 Mbit/sec, he added.

The main memory also features a storage-protection memory which allows blocks of 2K bytes to be protected by a 4-bit flag. This is useful for multiprogramming and protection of the operating system.

The 1040's CPU contains 16 general-purpose registers with a capacity of 32 bits.

The processor operates under microprogram control. Its microprogram, which is stored in read-only memory (ROM), has an access time of 11 nsec and a complete cycle of 450 nsec.

The 1040's instruction set contains a total of 143 commands, of which 87 are basic and eight are concerned with decimal arithmetic. Forty-four deal with floating-point operation, and the remaining four are divided between direct control and storage keys.

The real technology lag is evident in the Ryad peripherals, he said.

The disk system consists of a controller and two 7.2M-byte disk drives made in Bulgaria.

The East German-built tape subsystem uses a controller and two 9-track, 800 bit/in. drives that operate at 75 in./sec. They require three large cabinets in contrast to the one required to house a comparable CDC unit.

The system's 80-column card reader operates at 500 card/min and the card punch at 120 card/min. Both were made in the USSR.

The line printer has speeds up to 900 line/min and a feature that allows different forms to be printed simultaneously.

"To my knowledge, no domestic manufacturer offers this capability," Koenig said.

The Ryad 1040 uses two types of I/O channels, a multiplexer for slow-speed devices and up to six selector channels per system for high-speed units.

Channels are assigned different priority levels for memory access and have varying data rates that can be sustained with all channels active, Koenig said.

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In U.S. vs. IBM Hearing

GE Officer Details Accounting Methods

By Edith Holmes
Of the CW Staff

NEW YORK – "Eventually, everything is charged to profit and loss," John Ingersoll, a General Electric Corp. (GE) vice-president, said in explaining differences between GE's and Honeywell, Inc.'s methods of accounting for GE's computer business.

Ingersoll was responding to a question from IBM counsel in a U.S. vs. IBM antitrust case hearing held here recently to find out whether the companies' assessments of the worth of these assets meant anything.

The witness indicated essentially they did not, testifying GE tended to segment its accounts according to parts of specific businesses in an industry – "if the industry can be defined."

At the same time, Ingersoll stated the profits and losses associated with specific machines like GE's 605 military computer, its point-of-sale Tradar system or the GE645 were not accounted for separately or by product line.

Honeywell, however, made an effort to match expenses with revenues, he noted, adding that because of recent Financial Accounting Standards Board (FASB) rulings, this is no longer considered a sound accounting practice. Now all research and development expenses are charged directly to manufacturing costs.

In the long run, Honeywell's and GE's pictures of GE's financial ups and downs with its computer business would look the same, he concluded.

Ingersoll was part of the support staff for the Ventures Task Force which reviewed the plans for GE's Advanced Product Line (APL) and recommended the discontinuance of the computer business.

Those who devised the APL believed it would be possible to take away from IBM's market share given certain high risks, Ingersoll said.

One of the high-risk assumptions that went into the plan was the notion that IBM would accept a decline in its market share from 65% to 70% down to 59%, he stated.

GE would also be risking a great deal by an additional assumption that its other competitors would stand still while GE went after IBM.

Asked by IBM attorneys whether he knew the Antitrust Division of the Department of Justice would not have permitted GE to acquire a controlling interest in any entity resulting from the merger of its computer business with that of another, Ingersoll said he thought that such a government attitude was probable, but he didn't know it to have existed for a fact.

He did understand some of his superiors to be of the opinion that GE had the resources to be successful or that it needed to acquire a controlling interest in such a combined venture.

These people felt the Antitrust Division had set up obstacles to GE's acquisition of such control, he said.

In the decision not to go with the APL but to merge with Honeywell and to do so without a controlling interest, Ingersoll indicated few of those making that choice had extensive background in the marketing and manufacture of computers – including GE's current chairman and chief executive officer, Reginald H. Jones.

Ingersoll discussed the decision from the viewpoint of GE's losses of about $180 million through its computer business through 1970, the capital requirements of leasing and the management judgment that APL would be "an inappropriate project for the company to undertake because of the high risks associated with it and the effect it would have had on the company's finances."

DEC Heads '75 Federal Inventory In Number of Systems Installed

(Continued from Page 33)

Several trends begun in recent years continued during 1975. Machines falling under special management classifications continued to outnumber the machines in the general management classification, totaling 5,027 and 3,622 respectively.

Special categories included those machines in mobile or classified locations and those used for control or monitoring of a process or other equipment.

This trend began in 1973 when special classifications for the first time outnumbered the general category, 3,717 to 3,432.

In the general category, the ratio of owned computers to those leased continued to grow. In 1975 there were 2,670 purchased machines and 952 leased compared with the 1974 figures of 2,481 owned and 1,006 leased.

Under the general management classification, while systems with purchase price of $50,000 or less accounted for 11% of the number of total systems, they represented only 4% of the total purchase price of $2.89 billion.

The largest number of machines were found in the $50,001 to $200,000 price category, accounting for 26% of the total number; however, this represented only 3.1% of the value.

In the mid-range price category – $200,001 to $500,000 – there were 722 systems or 25% of the total number installed, which represented 8.3% of the total value.

The 20% of the systems in the $500,001 to $1.5 million range accounted for 19% of the installed value, while the most expensive category, 18% of the base number, represented 69.2% or $2 billion of the total purchase price within the general management classification.

Interdata Tops Rival Data General In the Field — The Football Field

LONG BRANCH, N.J. – Interdata, Inc. decisively tromped Data General Corp. 14-6 in the second annual Data Bowl flag football game played here recently.

The victory marked the second successive year Interdata won the game, and the large trophy donated by *Modern Data Magazine* was retained in Oceanport.

Members of the 22-man Interdata team suffered a broken collarbone and a dislocated shoulder during the game at the Long Branch high school football field, which was attended by about 350 spectators.

A Data General spokesman said he had not received an injury report yet. The firm will be looking at films of the game to select next year's quarterback, he added.

Timing for the two 45-minute halves was performed by nothing other than an Interdata 7/16 mini located in the press box.

A program was written with a loop to count down the time, and the console interrupt was used to stop the clock. Second-by-second times were displayed through the hexadecimal display on the console.

Interdata players were urged on by 10 other employees dressed in high school cheer leader costumes as well as baton twirlers and a vigorous kazoo band.

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David Kosko, Digital Test Programmer

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Hardware

We have openings for individuals with teaching experience on small and medium scale general purpose computers and peripherals, and for individuals with large, time-sharing system hardware experience. Data communication experience is desirable. In addition, you should be able to conduct on-going course development efforts in the area of student and lab guides, lesson plans, training aids and tests.

SOFTWARE PRODUCT SERVICES

Our accelerating growth situation has created career opportunities for professionals of demonstrated ability. Professionals who can perform within a challenging, yet exceptionally rewarding environment are needed in the following areas:

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These are high visibility staff positions with involvement at the corporate level. You will be responsible for planning and business management for software services. Working with Product Managers and Product Lines you will determine, negotiate, develop and monitor total software support plans and services. You should have sound business acumen as it relates to the world of software and computers, as well as, experience with sales and marketing as it relates to planning and promoting software support. Ability to function in a staff position requiring a high level of interpersonal skill is imperative. You should also have at least two years field support management experience. Both of these positions require a background in programming and an understanding of software product developments and field support issues associated with the products.

One of the above openings is for large systems and networks. Specifically DECsystem 10.

The second opening is for our New Hardware family and Real-Time Systems.

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These positions require an independent, self-motivated individual capable of interfacing with Product Management and Software Engineering. You should have a demonstrated knowledge of programming and product development, a background in computer systems (hardware and software) as well as some experience in sales/marketing as it relates to software support. These openings require prior field support/systems programming background in computer based communications/network or laboratory/instrumentation products.

All openings in the Product Service Group present excellent opportunities for career growth in software management, marketing or product planning.

**Please forward resume outlining salary requirements to
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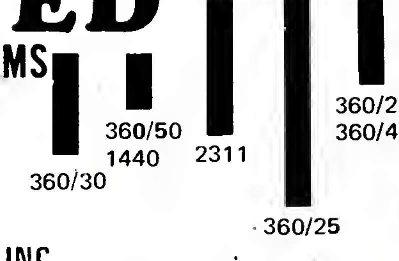

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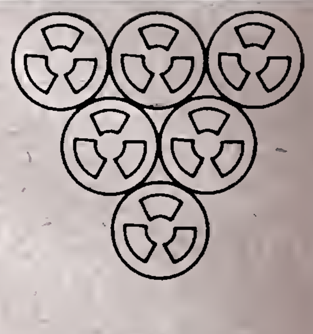

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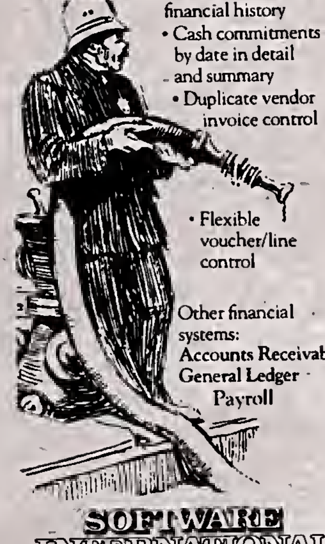

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At CMI, Fabri-Tek

Two Memory Makers Suffer Losses

Two memory makers, Cambridge Memories, Inc. (CMI) and Fabri-Tek, Inc. showed losses in recent statements. In both cases, the comparable year-ago period was profitable.

CMI lost $4.1 million in the year ended Aug. 31 as revenues declined to $18.9 million from $23.1 million last year.

The loss amounted to $2.43 a share compared with earnings of $1 million or 70 cents a share last year.

No Results in Quarter

The firm did not break out fourth-quarter results, but showed earnings during both the six months and third quarter.

"Revenues declined in the fourth quarter because of a lower level of shipments and a lower percentage of sales to operating leases in the mix of shipments," Joseph F. Kruy, CMI president, said.

"Also, fourth-quarter and fiscal year results were adversely affected by year-end adjustments which affected revenues and reserves for inventory and receivables, as well as certain assets and investments related to suspended operations," he added.

Fabri-tek's second quarter showed a loss of $376,000 or 10 cents a share compared with earnings of $126,000 or 3 cents a share in the same period last year.

Revenues declined to $7 million from nearly $8.5 million in the year-ago quarter.

Six Months Loss

For the six months, the firm lost $679,000 or 18 cents a share compared with earnings of $438,000 or 12 cents a share in the previous year's first half.

Six-month revenues fell to $14.6 million compared with nearly $19 million last year.

"A lower volume of sales along with an exchange loss resulting from the decline in value of the British pound are primarily responsible for the loss," according to L.D. Altman, Fabri-Tek president.

"The order picture appears to be firming up and additional cost cutting measures have been taken. We look for an improvement in the third and fourth quarters," he said.

Sale of Facility Boosts Earnings At Ampex $2 Million in Quarter

REDWOOD CITY, Calif. – Ampex Corp.'s second-quarter earnings rose $2 million above the year-ago results, aided in part by the sale of its Marina del Rey facility.

The firm is continuing its program of debt reduction and, as of Nov. 9, had repaid $33 million, bringing its indebtedness, excluding subordinated debentures, to $49.7 million, compared with a high point of $193 million in fiscal 1972.

Include Credits

For the quarter, Ampex earned $3.6 million or 33 cents a share compared with $1.6 million or 14 cents a share in the year-ago period.

The fiscal 1976 results include a $2.4 milion pretax gain on the sale of its Marina del Rey facility compared with a pretax gain of $1 million from the sale of a European facility in the same quarter last year.

Ampex plans to move its Memory Products Division and Data Products Division operations into a new leased facility in El Segundo, Calif. during the middle of next year.

The fiscal 1976 results also include tax credits of $1.5 million compared with $656,000 in 1975.

Second-quarter revenues rose to $66 million from $60 million in the same period last year.

Six-Month Earnings

For the six months, Ampex had operating earnings before special credits and taxes of $6.5 million compared with $4.5 million.

However, including the $13 million settlement received from IBM, Ampex six-month earnings were $5.2 million or 47 cents a share compared with $14.7 million or $1.35 a share in the year-ago period.

Six-month revenues rose to $129.7 million compared with $121.4 million.

Arthur Hausman, Ampex president, said "We are continuing to make progress in reducing our inventory levels through more efficient production techniques. Although sales have increased, our inventory has been reduced by 9% from the end of fiscal 1975."

Scan-Data Earnings Rise in Nine Months

NORRISTOWN, Pa. – Scan-Data Corp. reported increased revenues and earnings for the quarter and nine-month periods ending Sept. 30.

Revenues for the three months rose to $3.1 million compared with year-earlier revenues of $2.5 million. Earnings for the period were $85,139, or 5 cents a share compared with a loss of $29,744 or 2 cents a share in the same period last year.

For the nine-months, revenues grew to $8.2 million compared with nearly $7 million in the year-ago period.

Earnings rose to $191,384, or 11 cents a share compared with $13,452 or 1 cent a share a year earlier.

...Toward the Bottom Line

Computer Automation, Inc., Itel Corp. and **Centronics Data Computer Corp.** have joined the ranks of dividend payers.

Computer Automation will pay a semiannual dividend of 5 cents a share on Jan. 5 to shareholders of record Nov. 19; Itel paid a quarterly dividend of 5 cents a share on Nov. 28; and Centronics will pay 10 cents a share on Jan. 5 to shareholders of record Nov. 19.

$$$

Greyhound Computer will again omit its dividend on common, as it has since 1973.

$$$

Wang Laboratories, Inc.'s second quarterly dividend this year is 2.5 cents a share payable on Jan. 28, 1976 to shareholders of record Dec. 5.

$$$

IBM paid a regular quarterly dividend of $1.75 per share of common stock Dec. 10.

$$$

EMI Group has agreed to increase its holdings in **Threshold Technology** common stock to about 29%, subject to approval by Threshold shareholders. The transaction would contribute $500,000 to be used for expansion.

$$$

General Computer/Systems has signed a multimillion dollar lease-financing agreement with Citicorp Leasing, Inc. for equipment on leases of three years or more.

$$$

Sycor International Ltd. has received a $2 million line of credit to finance Canadian operations from Chemco Equipment Finance Canada, Ltd.

$$$

Western Digital anticipates its Data Com product line and its LSI-11 microprocessor will be the "key ingredients" of the firm's return to profitability, H.F. Faught, chairman said.

AUSTRALIA

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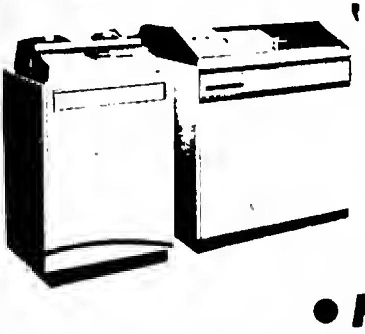

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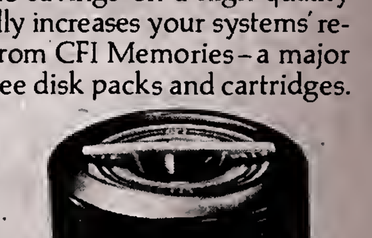

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Earnings Reports

VARIAN ASSOCIATES
Year Ended Sept. 30

	1975	1974
Shr Ernd	$1.11	$1.08
Revenue	310,444,000	293,005,000
Earnings	7,705,000	7,282,000
3 Mo Shr	.31	.30
Revenue	81,080,000	79,564,000
Earnings	2,187,000	2,031,000

ELECTRONIC DATA SYSTEMS
Three Months Ended Sept. 30

	1975	1974
Shr Ernd	$.29	$.28
Revenue	32,085,000	30,041,000
Earnings	3,518,000	3,359,000

MEMOREX
Three Months Ended Sept. 30

	1975	1974
Shr Ernd	$.91	$.12
Revenue	66,991,000	56,174,000
Spec Cred	a1,690,000	.....
Earnings	4,364,000	c513,000
9 Mo Shr	2.59	.....
Revenue	194,236,000	158,058,000
Spec Cred	b7,146,000	.....
Earnings	12,163,000	(6,439,000)

a-Tax-loss carryforward. b-Consists of $2.03 million gain on purchase of debentures and $5.12 million from tax-loss carryforward, including $1.88 million related to gain of purchase on the debentures. c-Reflects credit of $.9 million due to reversal of interest expense formerly charged to second-quarter operations.

APPLIED DATA RESEARCH
Nine Months Ended Sept. 30

	1975	a1974
Shr Ernd	$.20	$.06
Revenue	9,356,131	7,540,238
Disc Op	(131,840)	(54,741)
Tax Cred	113,000	254,000
Spec Chg	.....	b411,469
Earnings	240,692	75,976

a-Restated. b-Cumulative effect on prior year from accounting change.

BUNKER RAMO
Three Months Ended Sept. 30

	1975	a1974
Shr Ernd	.....	$.16
Revenue	$70,284,000	79,413,000
Earnings	(2,362,000)	1,613,000
9 Mo Shr	.....	.43
Revenue	218,473,000	238,716,000
Earnings	(1,897,000)	4,474,000

a-Restated.

CINCINNATI MILACRON
aThree Months Ended Oct. 4

	1975	1974
Shr Ernd	$.62	$.70
Revenue	126,486,024	130,089,576
Earnings	2,300,702	2,590,629
9 Mo Shr	1.89	2.45
Revenue	343,390,472	335,693,593
Earnings	7,004,735	b9,013,351

a-Sixteen-week period. b-Includes $1.8 million gain from sale of assets of a division.

COMPUTER NETWORK
Six Months Ended Sept. 30

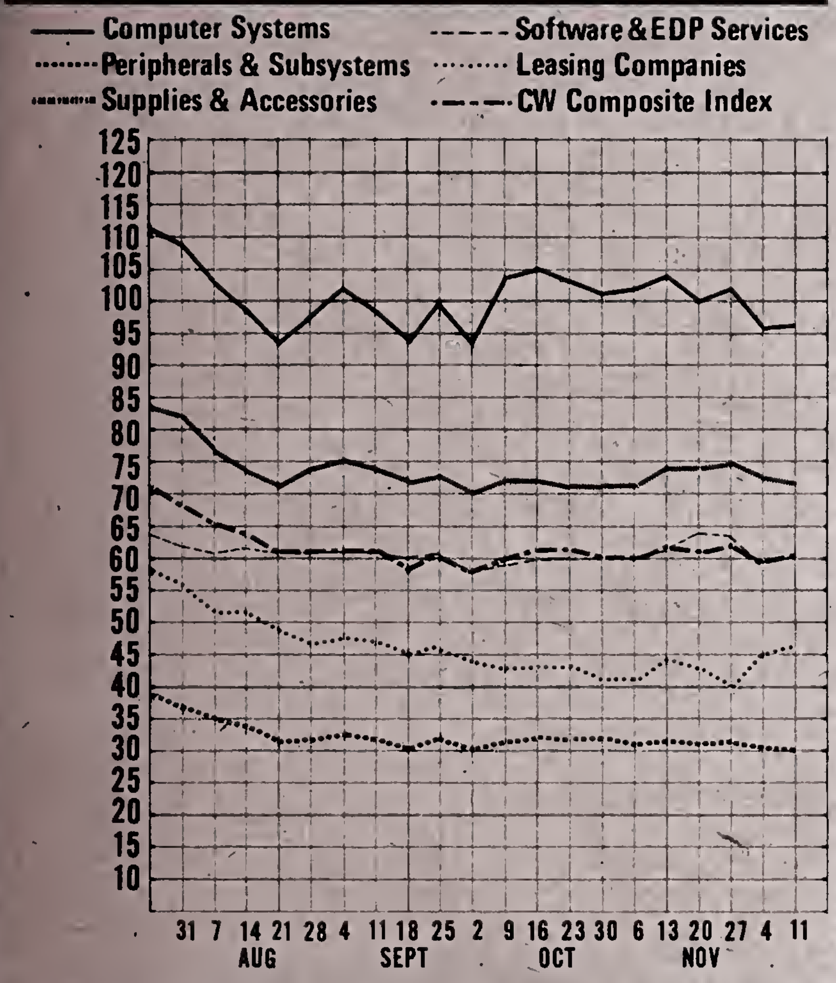
	1975	1974
Shr Ernd	$.66	.....
Revenue	3,650,000	$1,759,200
Tax Cred	370,000	.....
Earnings	766,000	(182,600)

ELECTRONIC ASSOCIATES
Three Months Ended Oct. 3

	1975	1974
Shr Ernd	$.60	.....
Revenue	7,413,000	$7,142,000
Disc Op	684,000	a(11,750,000)
Tax Cred	768,000	.....
Earnings	1,603,000	(11,805,000)
9 Mo Shr	.80	.....
Revenue	22,803,000	22,386,000
Disc Op	684,000	a(12,183,000)
Tax Cred	1,004,000	.....
Earnings	2,128,000	(11,991,000)

a-Includes $10 million loss from disposal of discontinued operations.

COMPUTERWORLD Computer Stocks Trading Indexes



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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 10, 1975

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1975 RANGE (1)	CLOSE DEC 10 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	62-109	84 1/2	+2 3/4	+3.3
O	COMPUTER AUTOMATION	2- 11	9 5/8	- 1/4	-2.5
N	CONTROL DATA CORP	11- 23	17 1/4	- 3/8	-2.1
N	DATA GENERAL CORP	10- 39	34	+ 7/8	+2.6
O	DATAPOINT CORP	6- 26	21 1/4	-1	-4.4
O	DIGITAL COMP CONTROL	1- 4	1 1/2	- 1/4	-14.2
N	DIGITAL EQUIPMENT	46-140	126 5/8	- 7/8	-0.6
N	ELECTRONIC ASSOC.	2- 3	1 7/8	- 1/8	-6.2
A	ELECTRONIC ENGINEER.	5- 10	7 1/2	0	0.0
N	FOXBORO	23- 42	27 3/8	+ 3/8	+1.3
O	GENERAL AUTOMATION	4- 14	6	+ 5/8	+11.6
O	GRI COMPUTER CORP	1- 1	1/2	0	0.0
N	HEWLETT-PACKARD CO	58-120	94 1/2	+ 3/4	+0.7
N	HONEYWELL INC	22- 40	32 3/8	- 1/4	-0.7
N	IBM	158-226	217 1/2	-1 1/2	-0.6
O	MEMOREX	1- 10	7 1/2	- 1/4	-3.2
O	MICRODATA CORP	2- 9	8 1/2	+1 1/8	+15.2
O	MODULAR COMPUTER SYS	5- 19	10	+ 3/4	+8.1
N	NCR	15- 39	21 1/2	- 1/2	-2.2
O	PRIME COMPUTER INC	2- 6	3 3/4	0	0.0
N	PERKIN-ELMER	16- 30	22	0	0.0
N	RAYTHEON CO	26- 59	43	- 3/4	-1.7
N	SINGER COMPANY	9- 17	9 3/4	- 1/8	-1.2
N	SPERRY RAND	26- 49	38	-1 3/4	-4.4
A	SYSTEMS ENG. LABS	1- 5	4	+ 3/8	+10.3
N	VARIAN ASSOCIATES	7- 18	12 3/4	+ 3/8	+3.0
N	WANG LABS.	7- 17	10	+ 1/8	+1.2
N	XEROX CORP	47- 86	49 1/4	+2	+4.2

LEASING COMPANIES

EXCH		PRICE 1975 RANGE (1)	CLOSE DEC 10 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	1- 5	3 7/8	0	0.0
A	COMMERCE GROUP CORP	2- 4	2 1/4	- 1/8	-5.2
A	COMPUTER INVSTRS GRP	1- 2	3/4	0	0.0
M	DATRONIC RENTAL	1- 1	1/2	0	0.0
A	DCL INC	0- 1	3/8	+	+16.7
N	DPF INC	3- 6	4 1/2	+ 1/8	+2.8
O	EDP RESOURCES	1- 2	1	0	0.0
A	GRANITE MGT	1- 5	4 1/2	0	0.0
A	GREYHOUND COMPUTER	2- 3	2 5/8	0	0.0
N	ITEL	3- 9	5 3/8	- 1/8	-2.2
N	LEASCO CORP	4- 8	5 7/8	+ 3/8	+6.8
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	0- 4	3/8	- 1/8	-25.0
A	PIONEER TEX CORP	2- 7	5 1/4	+ 1/2	+10.5
A	ROCKWOOD COMPUTER	1- 1	1/8	0	0.0
N	U.S. LEASING	7- 14	7 1/8	+ 1/8	+1.7

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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SOFTWARE & EDP SERVICES

EXCH		PRICE 1975 RANGE (1)	CLOSE DEC 10 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 1	1	+ 1/8	+14.2
A	APPLIED DATA RES.	1- 10	1 1/4	0	0.0
N	AUTOMATIC DATA PROC	29- 65	53 5/8	+1 3/8	+2.6
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	COMPUTER DIMENSIONS	2- 6	3	- 1/4	-7.6
O	COMP ELECTION SYSTMS	3- 7	5	0	0.0
O	COMPUTER HORIZONS	1- 1	5/8	0	0.0
O	COMPUTER NETWORK	1- 3	1 7/8	- 3/8	-16.6
N	COMPUTER SCIENCES	2- 6	3 5/8	- 3/8	-9.3
O	COMPUTER TASK GROUP	1- 1	5/8	0	0.0
O	COMPUTER USAGE	2- 4	2 1/2	+ 1/8	+5.2
O	COMSHARE	2- 4	2 1/2	- 1/8	-4.7
O	DATATAB	1- 2	1	0	0.0
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	11- 28	11 3/8	+ 1/8	+1.1
O	INFONATIONAL INC	1- 1	1/4	+ 1/8	+100.0
O	IPS COMPUTER MARKET.	1- 1	5/8	0	0.0
O	KEANE ASSOCIATES	2- 3	2 7/8	+ 1/4	+9.5
O	KEYDATA CORP	2- 4	3 1/2	- 3/8	-9.6
O	LOGICON	3- 5	3 3/8	0	0.0
A	MANAGEMENT DATA	1- 3	1 3/8	- 1/4	-15.3
A	NATIONAL CSS INC	6- 14	9 1/4	- 5/8	-6.3
O	NATIONAL COMPUTER CO	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 17	11 1/2	- 7/8	-7.0
N	PLANNING RESEARCH	2- 6	2 7/8	+ 1/8	+4.5
O	PROGRAMMING & SYS	1- 1	1/2	0	0.0
O	RAPIDATA INC	2- 5	3 1/2	- 3/8	-9.6
O	REYNOLDS & REYNOLD	10- 24	13 3/4	+1	+7.8
O	SCIENTIFIC COMPUTERS	1- 1	1	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1 1/4	+ 1/8	+11.1
O	TYMSHARE INC	7- 21	17 1/2	-1 1/4	-6.6
A	URS SYSTEMS	2- 4	2 3/4	- 1/8	-4.3
N	WYLY CORP	2- 4	2 7/8	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1975 RANGE (1)	CLOSE DEC 10 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	4- 9	7 1/2	- 1/8	-1.6
O	ADVANCED MEMORY SYS	1- 7	3 3/4	- 1/8	-3.2
N	AMPEX CORP	3- 7	4 3/4	- 1/4	-5.0
O	ANDERSON JACOBSON	1- 3	1 3/4	0	0.0
O	BEEHIVE MEDICAL ELEC	1- 5	3 1/8	0	0.0
A	BOLT, BERANEK & NEW	5- 13	7	+ 3/8	+5.6
N	BUNKER-RAMO	4- 8	3 7/8	0	0.0
A	CALCOMP	3- 7	3 1/4	+ 1/4	+8.3
O	CAMBRIDGE MEMORIES	1- 5	2	+ 1/2	+33.3
N	CENTRONICS DATA COMP	7- 25	17 7/8	- 3/8	-2.0
O	CODEX CORP	15- 38	30	-1	-3.2
O	COGNITRONICS	1- 2	5/8	- 1/8	-16.6
O	COMPUTER COMMUN.	1- 2	1	0	0.0
O	COMPUTER CONSOLES	3- 7	3 1/2	- 1/4	-6.6
A	COMPUTER EQUIPMENT	1- 2	1 1/4	0	0.0
O	COMPUTER MACHINERY	1- 2	5/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 2	7/8	- 1/8	-12.5
O	COMTEN	2- 5	3 1/8	- 1/4	-7.4
N	CONRAC CORP	12- 30	26	+ 3/4	+2.9
O	DATA ACCESS SYSTEMS	1- 3	2	0	0.0
O	DATA 100	5- 16	8 3/4	- 1/4	-2.7
A	DATA PRODUCTS CORP	2- 6	3 5/8	- 1/8	-3.3
O	DATA TECHNOLOGY	1- 3	1 1/4	0	0.0
O	DATUM INC	1- 2	1/2	- 1/8	-20.0
O	DECISION DATA COMPUT	2- 7	2 7/8	+ 1/8	+4.5
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
O	DI/AN CONTROLS	1- 1	3/4	0	0.0
N	ELECTRONIC M & M	1- 3	1 1/8	- 1/8	-10.0
O	FABRI-TEK	1- 1	3/4	0	0.0
O	GENERAL COMPUTER SYS	1- 2	2 1/4	0	0.0
N	HAZELTINE CORP	3- 6	3 1/8	+ 1/8	+4.1
N	HARRIS CORP	18- 33	29 1/4	+ 3/8	+1.2
A	INCOTERM CORP	3- 12	8	+ 1/4	+3.2
O	INFOREX INC	2- 5	2 3/8	- 1/8	-5.0
O	INFORMATION INTL INC	8- 14	9 3/4	- 7/8	-8.2
A	LUNDY ELECTRONICS	3- 6	5	+ 3/8	+8.1
O	MANAGEMENT ASSIST	1- 1	1/2	0	0.0
A	MILGO ELECTRONICS	8- 24	14 1/8	-1 1/8	-7.3
N	MOHAWK DATA SCI	1- 5	3 1/4	+ 1/2	+18.1
O	OPTICAL SCANNING	1- 3	1 7/8	0	0.0
O	PENRIL CORP	2- 2	1	0	0.0
O	PERTEC CORP	2- 8	3 1/2	- 1/4	-6.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	1- 1	1/2	0	0.0
O	QUANTOR CORP	2- 6	4 1/4	+ 3/8	+9.6
O	RECOGNITION EQUIP	2- 9	5 3/8	+ 1/4	+4.8
N	SANDERS ASSOCIATES	3- 11	6 1/8	- 3/8	-5.7
O	SCAN DATA	1- 3	1 3/4	+ 1/4	+16.6
O	STORAGE TECHNOLOGY	6- 17	10 3/8	+1	+10.6
O	SYCOR INC	5- 22	16 1/4	-1 1/4	-7.1
O	T BAR INC	3- 6	6 1/4	0	0.0
O	TALLY CORP.	1- 5	2 1/2	0	0.0
O	TEC INC	1- 4	1 3/4	- 1/4	-12.5
N	TEKTRONIX INC	18- 45	44	+2 3/4	+6.6
N	TELEX	1- 3	2	- 1/8	-5.8
O	WANGCO INC	4- 9	7 1/2	+ 1/8	+1.6
O	WILTEK INC	1- 4	1	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1975 RANGE (1)	CLOSE DEC 10 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- 5	4 1/4	- 1/4	-5.5
A	BARRY WRIGHT	5- 7	5 1/2	- 1/8	-2.2
O	CYBERMATICS INC	0- 1	3/8	0	0.0
A	DATA DOCUMENTS	29- 42	30	-1 1/4	-4.0
O	DUPLEX PRODUCTS INC	12- 25	17	0	0.0
N	ENNIS BUS. FORMS	5- 7	5 1/4	- 1/4	-4.5
O	GRAHAM MAGNETICS	5- 10	8 3/4	0	0.0
O	GRAPHIC CONTROLS	8- 21	12	- 1/2	-4.0
N	3M COMPANY	43- 68	57 3/4	- 3/4	-1.2
O	MOORE CORP LTD	39- 51	45 3/4	-1	-2.1
N	NASHUA CORP	9- 22	9 1/2	- 3/8	-3.7
O	STANDARD REGISTER	11- 20	16 1/4	+ 1/4	+1.5
O	TAB PRODUCTS CO	4- 8	4 1/2	- 1/2	-10.0
N	UARCO	17- 24	20	+ 1/4	+1.2
O	VANIER GRAPHICS CORP	4- 7	4 3/4	0	0.0
A	WABASH MAGNETICS	3- 5	3 5/8	0	0.0
N	WALLACE BUS FORMS	15- 25	18 1/2	+ 1/4	+1.3

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